BJC-4300

SERVICE MANUAL

Canon

Application

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This manual was produced on an Apple Macintosh™ Power Mac 8500/180 personal computer and Apple LaserWriter™16/600PS-J laser beam printer: final pages were printed on Varityper™ 5300 with 4000-J RIP. All graphics were produced with MACROMEDIA® FREEHAND® 5.5J.
All documents and all page layouts were created with QuarkXPress™ 3.3J.

I. ABOUT THIS MANUAL

This manual is divided into four sections, and contains information required for servicing the unit.

Part 1: Safety and Precautions

This section tells you how to service the unit safely. It is very important, so please read it.

Part 2: Product Specifications

This section outlines and specification.

Part 3: Operating Instructions

This section explains how to operate the unit properly. Information required about installation and service made.

Part 4: Technical Reference

This section outlines the way the unit operates so you can understand it technically.

Part 5: Maintenance

This section explains how to maintain the unit. Descriptions of assembly/disassembly, adjustment for assembly, troubleshooting procedures, and wiring/circuit diagrams are given.

Procedures for assembly/disassembly are not given in this manual.
See the illustrations in the separate Parts Catalog.

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1. SAFETY PRECAUTIONS

1.1 Moving Parts

The moving parts of the printer are shown below. They include the carriage belt, idler roller, carriage, slow down gear, paper feed roller, pressure roller, eject roller, spurs. and pick-up roller. The first three parts above are driven by the carriage motor while the latter are driven by the paper feed motor. Avoid getting hair, clothing, personal ornaments, etc., caught in these moving parts.

Also note that the spurs are made of metal and have sharp edges. Avoid touching these spurs with bare hands.

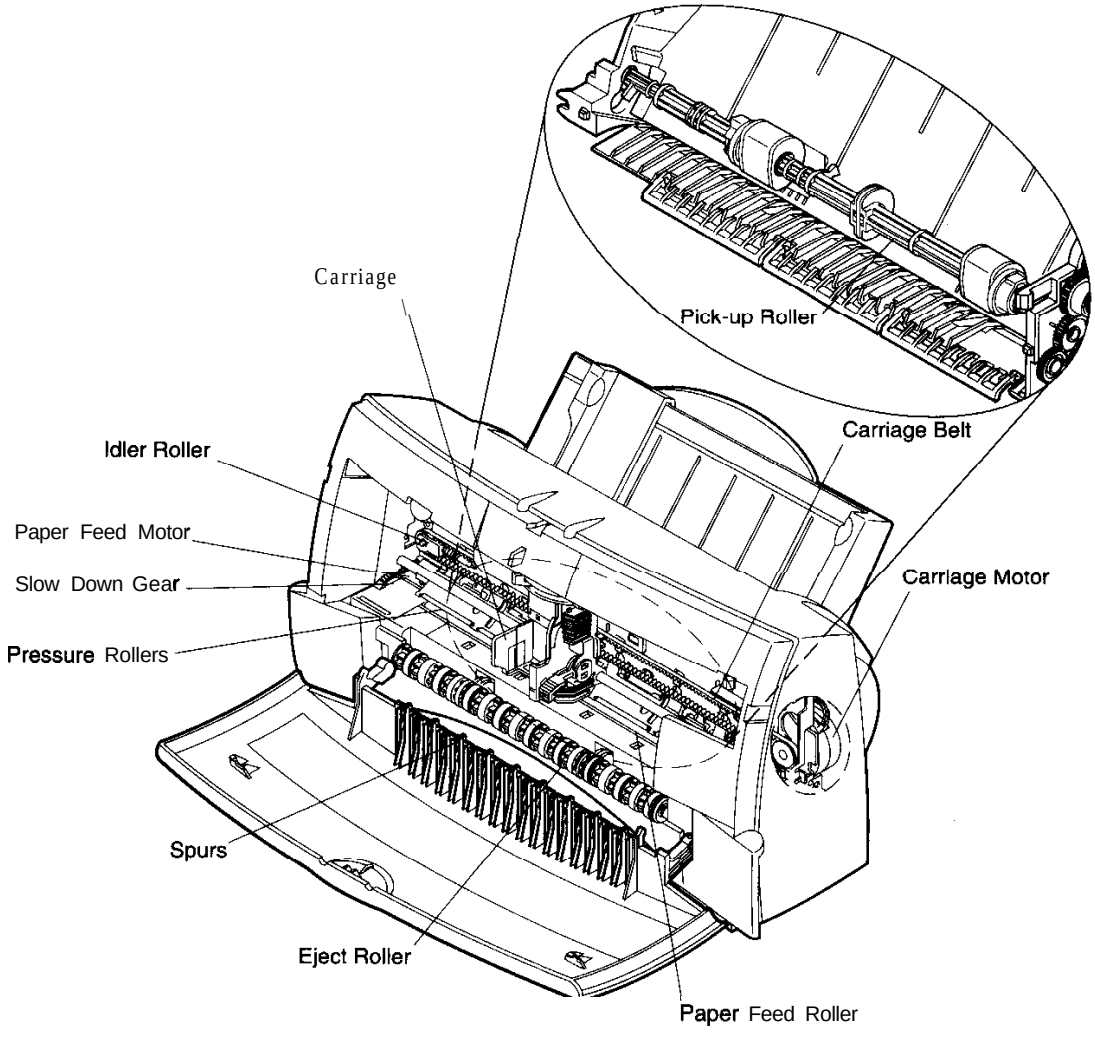

Figure l-l Moving Parts of the Printer

1.2 Ink Stains

1.2.1 Ink path

Do not touch the ink path while servicing as the ink can stain hands, work table, clothing, etc.

The ink path consists of the BJ cartridge nozzles, head cap, head wiper, maintenance jet receiving section, and waste ink absorber.

In the case of color BJ cartridges, the cartridge's ink outlets and joint pipes are also part of the ink path.

Caution!

Although the ink is non-toxic, it contains organic solvents.
Isopropyl alcohol 67-63-0, glycerin 56-81-5, and ethyleneglycol 107-21-l in black ink and isopropyl alcohol 67-63-O in color inks. Do not get ink in your eyes and mouth. If any ink should get into your eyes, wash out with plenty of water and consult a doctor. If a large amount of the ink is consumed, consult a doctor immediately.
Give the doctor the information on the BJ cartridge label. Since the ink contains dyes, any ink stains on clothing, etc., are permanent.

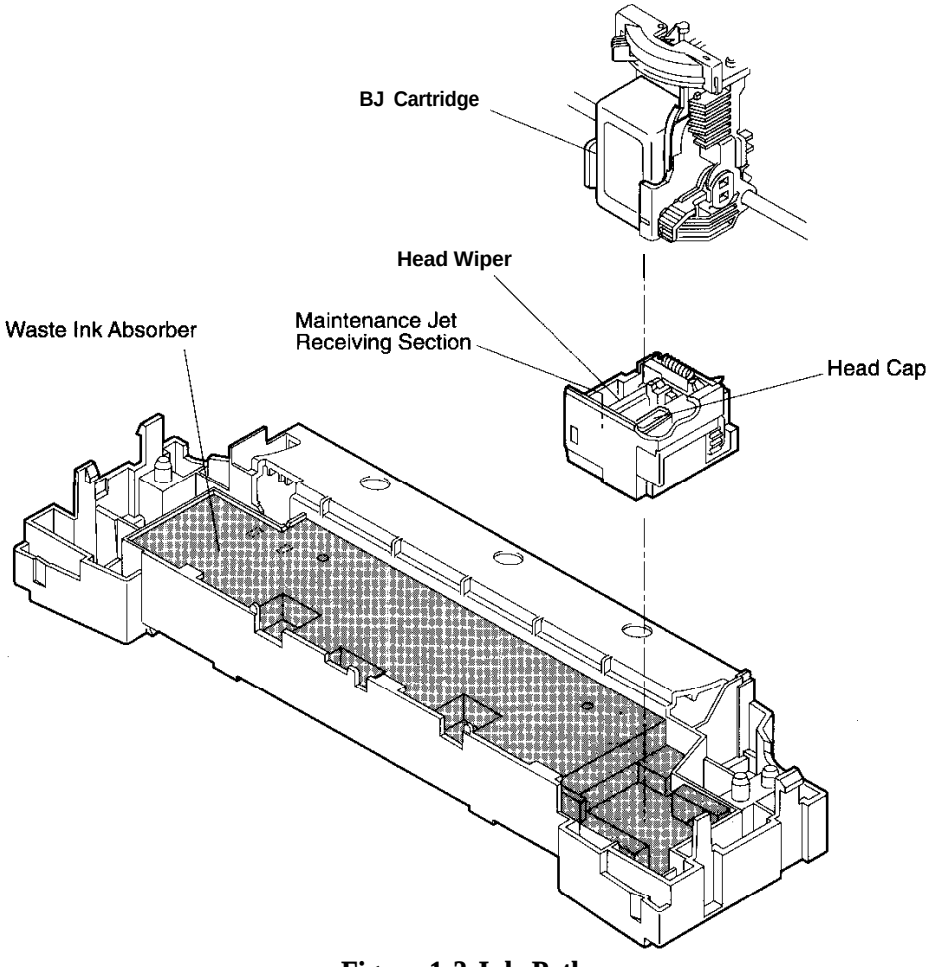

Figure 1-2 Ink Path

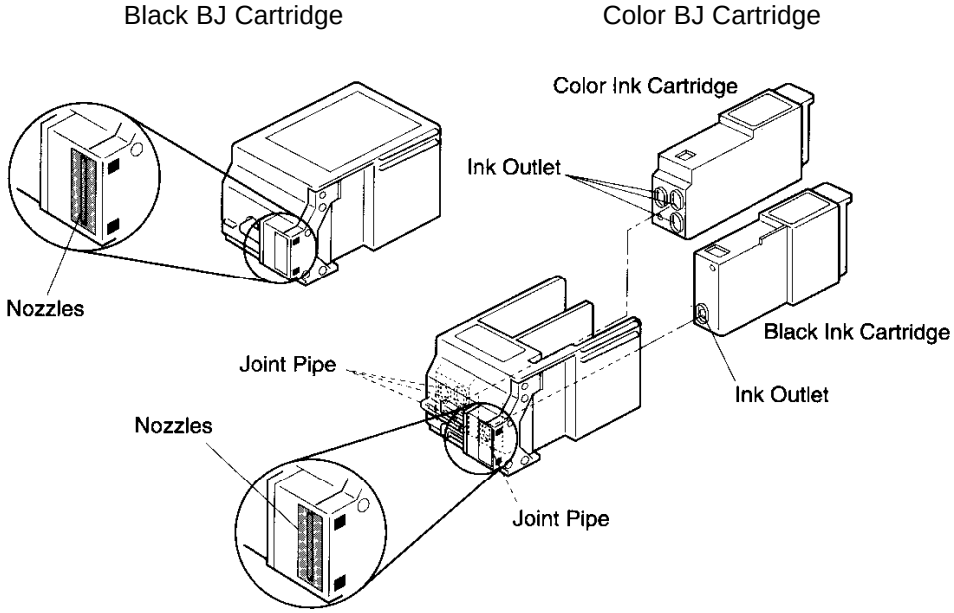

Figure 1-3 Ink Path of the BJ Cartridge

1.2.2 Ink mist

The BJ cartridge ejects ink onto the paper. During prolonged or heavy-duty use of the printer, the small amounts of ink mist which splatter off the paper during printing can contaminate the inside of the front cover and platen.

Clean any contaminated parts with a soft moist cloth. Ink in such areas can contaminate the back of the paper and dirty hands and clothing while servicing.

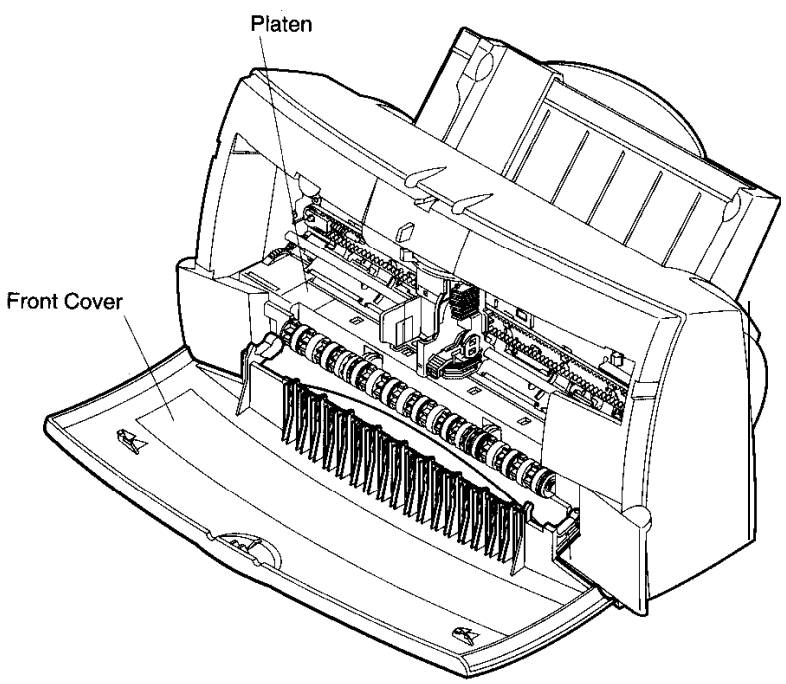

Figure 1-4 Ink Mist

1.3 BJ Cartridge Heat-Up

Do not touch the BJ cartridge's aluminum plate. The aluminum plate heats up during printing and becomes particularly hot during prolonged and continuous printing. It can overheat also if printing is continued even after the cartridge has run out of ink.

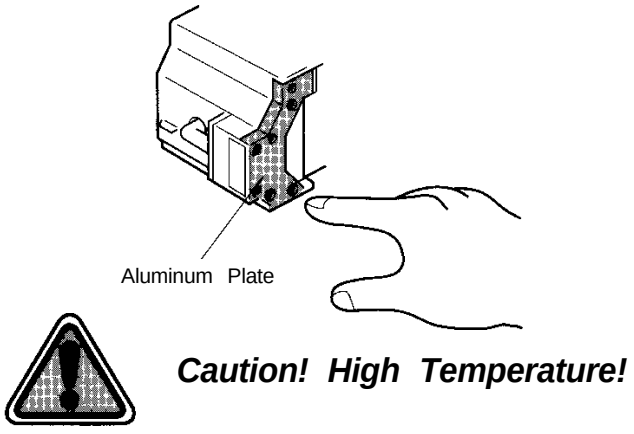

Figure l-5 BJ Cartridge Aluminum Plate

NOTE

The printer has a protective mechanism when the BJ cartridge heats up. The protective mechanism is activated when the head temperature (diode) sensor in the BJ cartridge senses a certain temperature.

Protection level 1:

This level prevents the user from touching the bubble jet head's hot aluminum plate when the bubble jet head is replaced. When the user tries to manually move the carriage to the cartridge replacement position, the beeper will sound three times and the cartridge cannot be replaced. Depending on the protection level, the user may even be prevented from replacing the cartridge until a set period of time passes.

Protection level 2:

If a still higher temperature is detected, the carriage is returned to the home position for 3.5 seconds to bring down the temperature. After the resting period, printing will resume. This continues for over 20 seconds to lower the bubble jet head's temperature.

Protection level 3:

If the temperature continues to increase, a head temperature error occurs. This stops the printing operation. If this still does not lower the head temperature, the sensor is deemed faulty and a head temperature sensor error will be indicated.

REF.

When printing is stopped by a head temperature error or a head temperature sensor error, follow the troubleshooting procedures in Par? *5: 6.TROUBLESHOOTING (page 5-10).*

2. MACHINE PRECAUTIONS

2.1 Handling BJ Cartridges

2.1.1 Unpacking the BJ cartridge

Do not unpack the BJ cartridge until it is ready to be used. Before installing the BJ cartridge in the printer, remove the cap protecting the nozzles and gently peel off the protective tape.

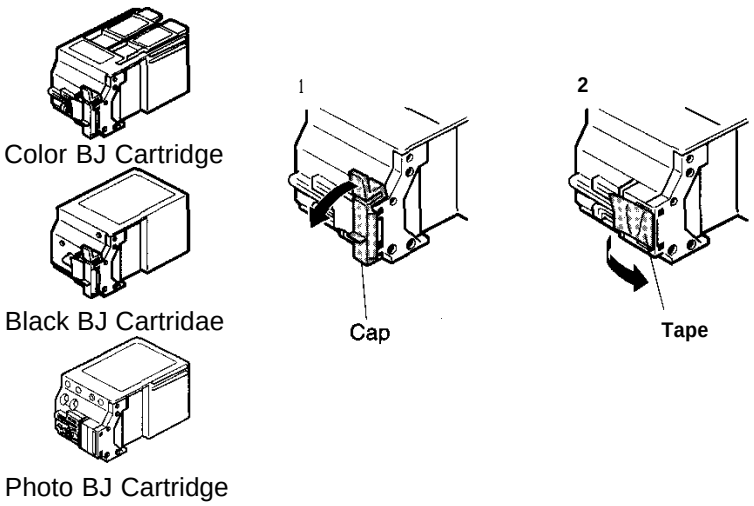

Figure 1-6 Removing the BJ Cartridge Protector

2.1.2 Preventing clogged nozzles

Never touch or wipe the nozzles with tissue paper, etc. to prevent them from clogging. To prevent dirt or dried ink from clogging the nozzles however,install the BJ cartridge immediately in the printer or in the cartridge container after removing the cap and peeling off the protective tape.

Do not attempt to reuse the cap or tape as doing so can cause print defects.

Do not store the color BJ cartridge with the ink cartridge removed.

BJ cartridges cannot be disassembled, reassembled, or washed.

NOTE Clogged nozzles can cause white streaks across printed areas . If this problem persists even after the ink cartridge is cleaned by the printer, replace the BJ cartridge.

a

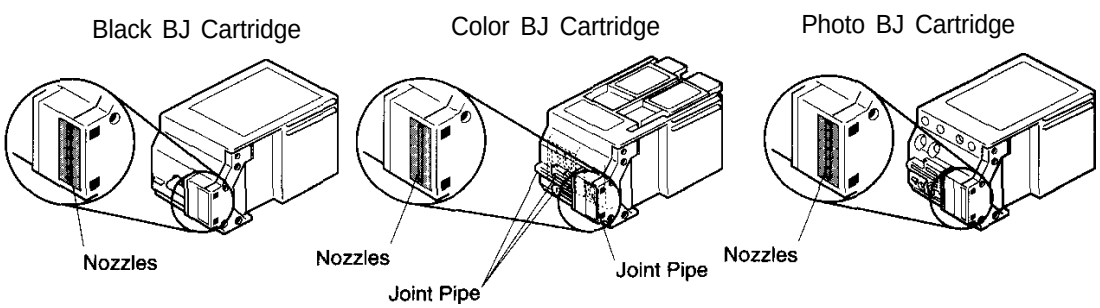

Figure 1-7 BJ Cartridge

2.1.3 Power on/off

When the printer is turned off with the *POWER* button and auto power off function, the printer automatically caps the BJ cartridge's nozzles for their protection and to prevent ink leakage.

If the DC power cord is disconnected before the printer is turned off with the *POWER* button, the nozzles will not be capped. In such cases, reconnect the DC power cord, start up the printer as usual, then turn off the printer with the *POWER* button.

If the nozzles are not capped, the ink may leak and dry out causing the nozzles to clog.

2.1.4 When not using the printer

Keep the BJ cartridge installed in the printer even when the printer is not in use. Also keep it installed while carrying, transporting, or storing the printer. If the BJ cartridge's package has been opened but the cartridge is not to be installed immediately, store the cartridge in the cartridge container.

If the BJ cartridge is removed from the printer, ink may leak and dry out causing the nozzle to clog.

2.1.5 Ink electroconductivity

The ink in the BJ cartridge is electroconductive. If ink leaks into the printer's mechanical parts, use a damp paper towel, etc., to wipe clean. If it leaks into the printer's electrical components, use tissue paper, etc., to wipe clean completely; If ink gets into the IC chips on the PCB and it is difficult to clean, replace the PCB.

Never turn on the printer if ink has leaked inside the printer. It may damage the circuitry.

2.2 Handling Ink Cartridges

2.2.1 Unpacking the ink cartridge

Do not unpack the ink cartridge until it is ready to be used. Before installing it in the color BJ cartridge, remove the cap covering the ink outlets.

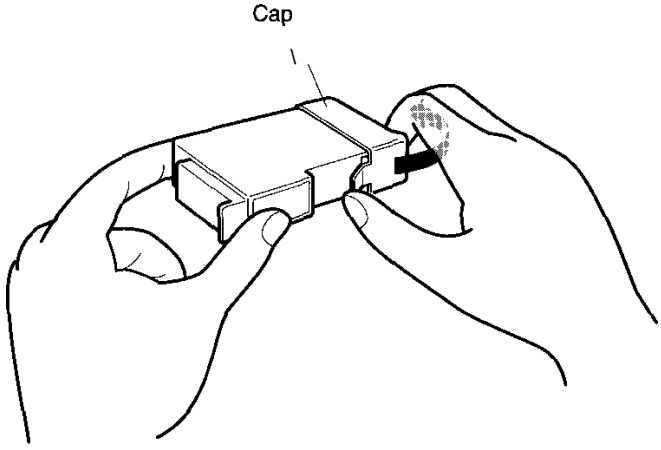

Figure 1-8 Removing the Ink Cartridge Cap

2.2.2 Preventing clogging

To prevent poor ink suction due to clogging of the joint pipes, never touch the ink cartridge's ink outlets. After removing the cap from the ink cartridge. promptly install the ink cartridge in the BJ cartridge to prevent the nozzles from clogging due to dried-out ink and dust, etc. Do not remove an ink cartridge from BJ cartridge unless replacing.

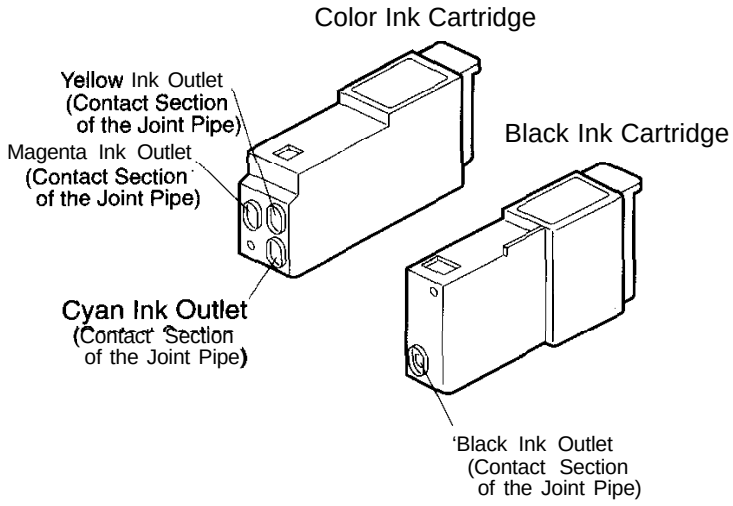

Figure 1-9 Ink Cartridge Protection

2.3 Printer Precautions

2.3.1 Spur deformation prevention

Do not deform the tips of the spurs.

The spurs come into contact with the paper after printing. As the actual contact surface is small, any ink adhering to the spurs is minute and wiped off by the spur cleaners. Therefore any ink on the spurs is not enough to contaminate the paper as it passes. However, if the spurs become deformed, their contact surface with the paper increases, causing more ink to adhere to each spur. Since the spur cleaner is unable to wipe off all the ink, a line of dotted ink may mask the printed paper.

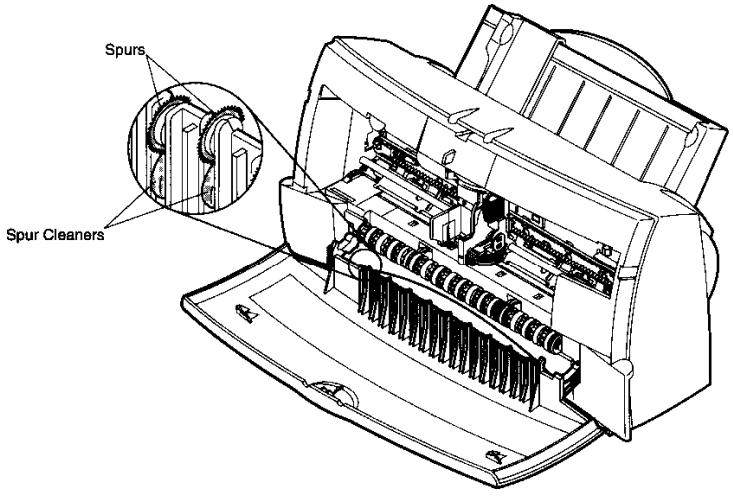

Figure l-10 Spurs and Spur Cleaner

2.3.2 Static electricity damage prevention

The static charge that accumulates in your body from clothing can damage electrical components. Therefore never touch the electrical contacts of the carriage ribbon cable and BJ cartridge.

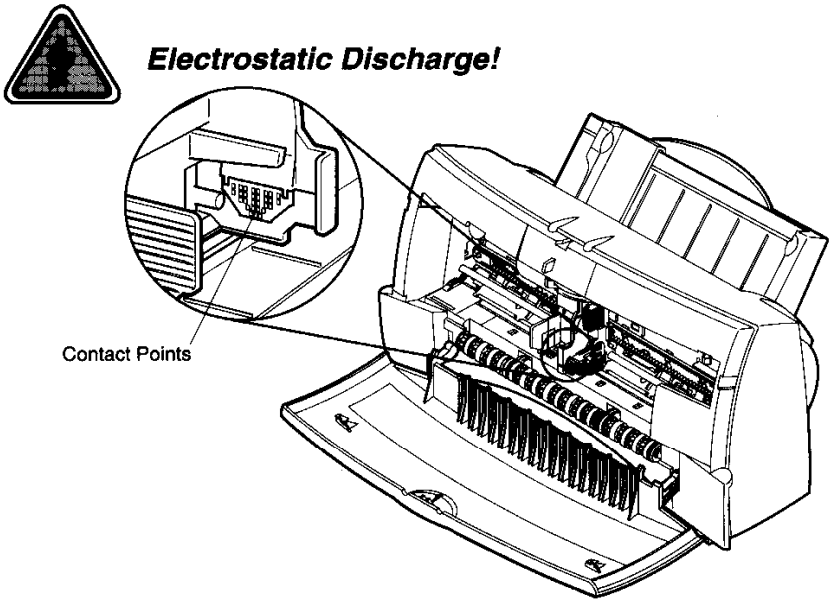

Figure l-11 Carriage Ribbon Cable's Electrical Contacts

2.3.3 Ink leakage prevention

Do not pack, transport, or store the printer without a BJ cartridge installed. Without a BJ cartridge installed, the ink in the purge unit will leak and disperse inside the printer. When packing the printer, make sure the carriage is at the capping position (the right end of the platen).

The BJ cartridge's nozzles are capped automatically when the power is turned off with the POWER button. Do not disconnect the DC power cord before turning off the printer with the POWER button. Otherwise, the nozzles will not be capped.

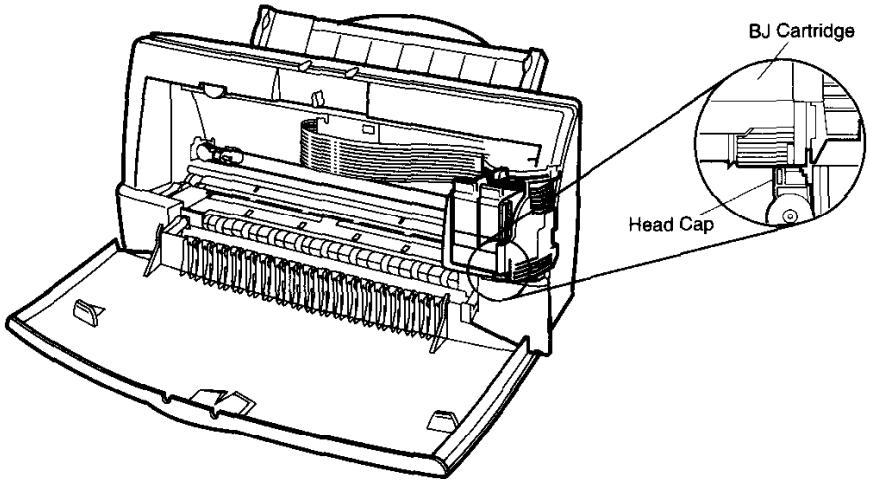

Figure 1-12 Capping Position

2.3.4 Waste ink adhesion prevention

When the printer is turned off with the POWER button, the printer automatically drives the gears in the purge unit (the maintenance jet receiving section) to remove waste ink on the gears. If waste ink remains on the gears, it may dry out and affect the purge unit's operation.

Do not disconnect the DC power cord before turning off the printer with the ***POWER*** button. Otherwise, the printer will not drive the gears to remove the waste ink. Always press the ***POWER*** button to turn off the printer before disconnecting the DC power cord.

2.4 Scanner Precautions

2.4.1 Scanner Cartridge Protection

Do not touch the scanning head of the scanner cartridge as it may affect the quality and ability of the scanning operation. When cleaning the scanner lens, wipe gently with a soft damp cloth and wipe off any excess moisture with a soft dry cloth or paper. To avoid damage caused by miscontact or static charge, do not touch the contact terminals. Scanner cartridge cannot be disassembled, reassembled, or washed.

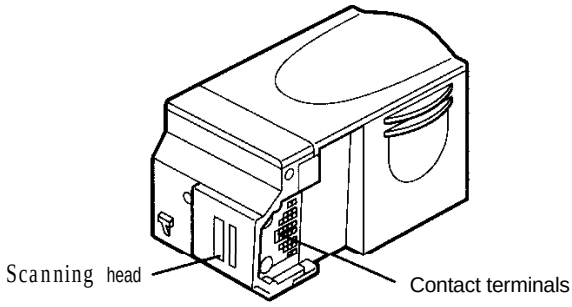

Figure 1-13 Scanner Cartridge

2.4.2 Scanning Precautions

The scanning document should be placed between the scanning holder to prevent staining or scratching. Do not feed thick or bent paper. Also direct feeding of thin paper or comer-folded paper may result in paper jamming.

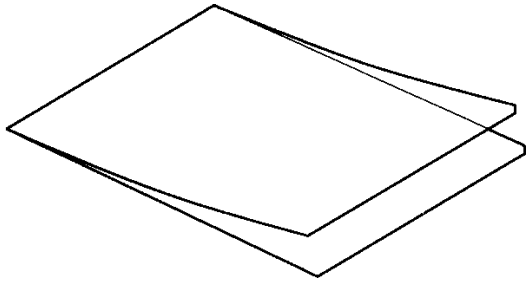

Figure 1-14 Scanning Holder

3. PRECAUTIONS FOR SERVICE

3.1 EEPROM Data Precautions

The printer keeps track of various settings, the total waste ink amount, and the total sheets printed with the black, color and photo BJ cartridges. This data is stored in the EEPROM on the logic board. Note the following precautions during servicing:

1) Before servicing

Check the EEPROM data with a test print. The total sheets printed can give you an idea of how much the printer has been used.

2) **During logic board (EEPROM) replacement**

Always visually check the waste ink amount absorbed by the waste ink absorbers and replace them when necessary as explained in *Part* 5: 4.3 Logic *Board and Waste Ink Absorber Replacement Cautions (page 5-5).*

If the waste ink absorbers are not visually checked regularly, they may reach or exceed their full capacity before "waste ink full" is detected. The waste ink may therefore start leaking.

The memory data for the replacement logic board (EEPROM) is not defined. Therefore, after replacing the logic board (and EEPROM), reset the total waste ink amount to zero by clearing the data.

3) After **waste ink absorber replacement**

After replacing the waste ink absorbers, reset the total waste ink amount to zero by clearing the EEPROM data.

After the EEPROM is reset, the data it contained cannot be printed out with a test printout. If you want to check the stored data, be sure to execute test printout before resetting the EEPROM.

When the stored data is reset, the various settings, the total count of printed sheets, and the total waste ink amount will all be reset. The total sheets printed and waste ink amount cannot be input using the control panel.

Immediately after the printer is started, it keeps track of the estimated waste ink amount based on the usage conditions. To prevent ink leakage when the waste ink amount exceeds the waste ink absorption capacity, the printer stops printing and indicates an error when the waste ink absorption capacity is close to being full.

For details on checking the EEPROM data with a test printout and for clearing the data, see *Part 3: 3.6 EEPROM Reset(page 3-25).*

If the printer stops operating in the case of a waste ink full error, follow the countermeasures described in *Part* 5: 6. *TROUBLESHOOTING (page 5-10).*

3.2 Static Electricity Precautions

'Ike static charge accumulated in the body from clothing can damage electrical components. To dispel the build-up of static electricity, touch a metallic object that is grounded. Be sure to do this before disassembling the printer for servicing. Before dispelling your static charge build-up, do not touch the electrical contacts on the logic board and on the carriage ribbon cable (see Figure I-11) while the carriage ribbon cable is connected to the logic board.

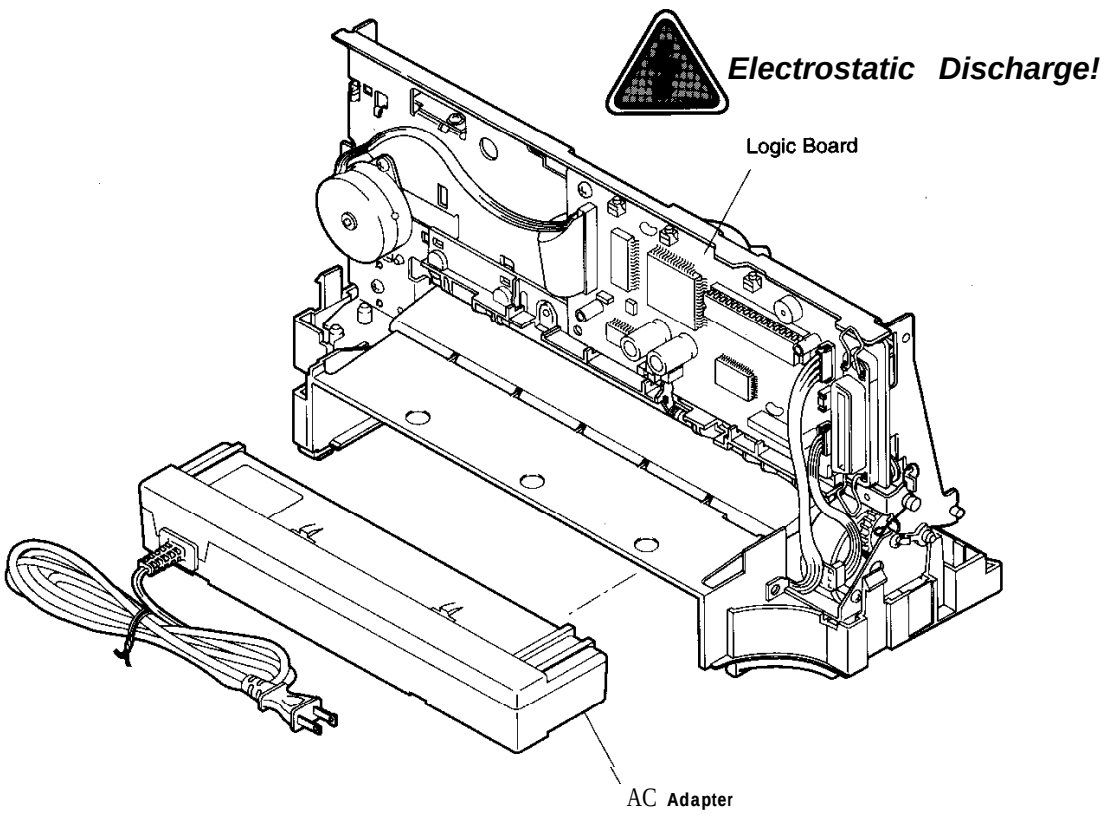

Figure 1-15 Electrical System of Printer

3.3 Disassembly and Reassembly Precautions

The printer is comprised of a large number of plastic parts. When disassembling the printer, take care not to break or bend plastic hooks.

CAUTION

Since some plastic parts contain glass fibers for extra rigidity and precision, but since their viscosity is low. plastic hooks can break easily when excessive force is used. Use a precision screwdriver, and do not pull plastic hooks with excessive force while unhooking them.

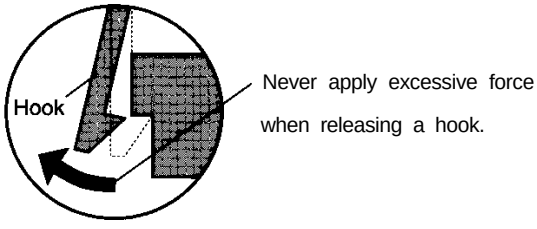

Figure 1-16 How to Release Plastic Hooks

3.4 Self-Diagnosis

The printer has a self-diagnosis feature to detect hardware defects. The results of the self-diagnosis are indicated by the indicators and the beeper. For details, see *Part* 3: 3.1 *Error Indications (page 3-14).*

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1. PRODUCT OUTLINE

1.1 Product Outline

This printer is a value added, full color bubble jet desktop printer that enjoys the realization of high image printing through the implementation of the PhotoRealism concept.

This printer achieves high image printing by adopting "drop modulation technology" in the color BJ cartridge and the photo BJ cartridge.

The expanded printing environment has allowed the printer to have banner printing capabilities. The printer can also be used as a compact color scanner when the optional scanner cartridge is installed in the carriage.

All the function settings are easily set by the personal computer. The operation is easily performed with the bidirectional Centronics interface (effective only for the device ID response)

This printer uses a built-in AC adapter. This is a small and light weight personal color printer with high performance capabilities.

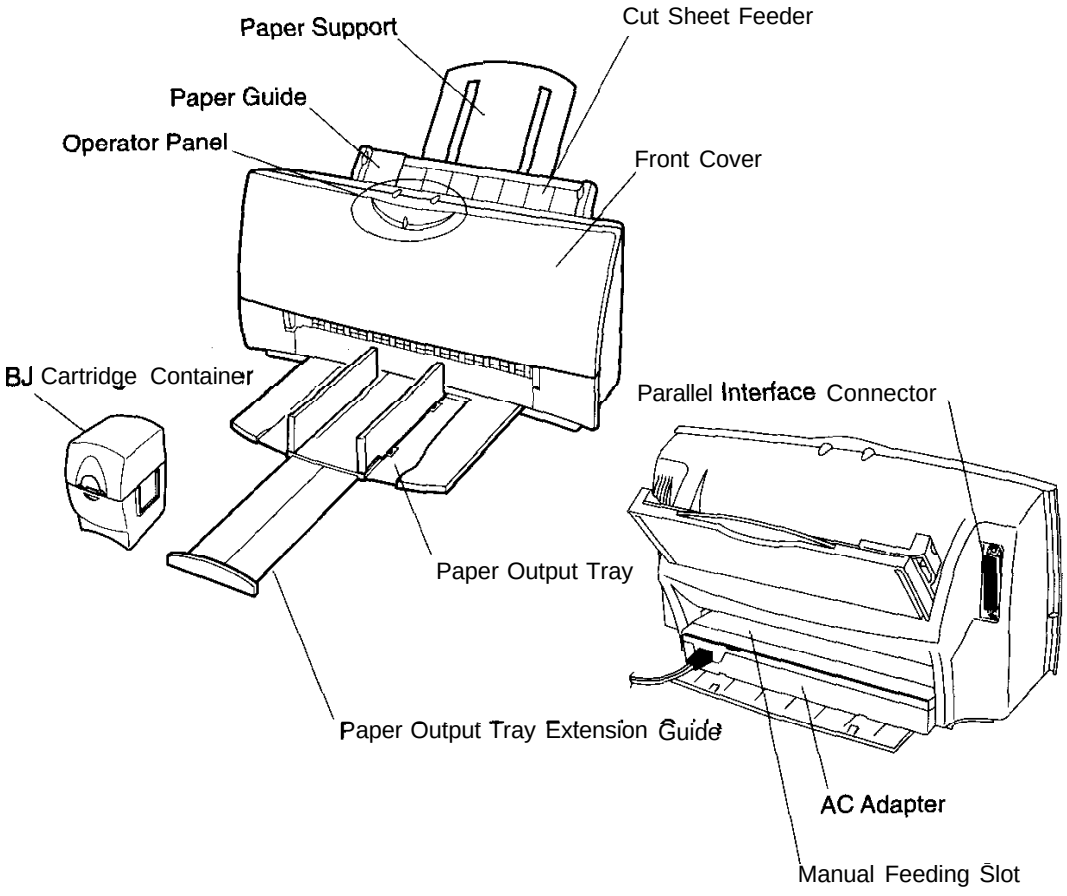


Figure 2-1 Printer Exterior

1.2 Features

1. Compact (desk-top size)
   Dimensions: 383 mm W x 231.6 mm D x 203 mm H
   Weight: Approx. 3.5 kg (7.7 lbs) (including color BJ cartridge)
2. Built-in AC adapter employs a high-current capable switching power supply, power saving control is not performed with print duty.)
3. Automatic power control (auto power on/off)
4. High quality printing of 720 x 360 dpi (in both monochrome and black when using the special printer driver)
5. Two standard built-in printer control modes
   LQ mode (EPSON LQ-2550 emulation)
   BJ mode (IBM Proprinter X24E emulation)
   [Canon extended mode is supported when using the canon printer driver.1
6. User replaceable BJ cartridge and adopting drop modulation technology color/ photo BJ cartridge

Color BJ Cartridge (Multi drop)	Drop modulation technology has been adopted. It has separate ink cartridges (Bk) (Y, M, C) and the head with 136 nozzles in a vertical line: 64 nozzles (Bk) + 24 nozzles x 3 (Y, M, Cl.
Black BJ Cartridge	Contains the black ink and the head with 128 nozzles. Depending on each sales territory, it is not packed with the printer, but is available separately.
Photo BJ Cartridge (Multi drop)	Drop modulation technology has been adopted. It has integrated ink cartridges with the head with 136 nozzles in a vertical line; 64 nozzles (Bk) + 24 nozzles x 3 (Y, M, C).
Black ink cartridge	Black ink cartridge for the color BJ cartridge.
Color ink cartridge	Tri-color (Y, M, C) ink cartridge for the color BJ cartridge.

   (*Previous color and photo BJ cartridges that do not use drop modulation technology may be used, however the printing quality will be the same as when drop modulation technology is not used.)
7. Device ID compatible to “Plug and Play”
   (Responds only to the device ID/status of nibble mode)
8. Banner printing capabilities.
9. Capable of the double paper feeding with the leverless cut sheet feeder and manual feed. (It is possible to feed paper manually even when the paper has been set on the cut sheet feeder.)
10. Photo quality printing using the Photo kit option and the photo printing special driver.
11. Cartridge container packed with the printer.
12. High quality photo image input using the option color image scanner cartridge.

1.3 BJ Cartridge

1.3.1 Color BJ cartridge (Multi Drop)

The disposable color BJ cartridge is comprised of a 136-nozzle print head and two replaceable ink cartridge (black and color).When the ink runs out or more than 6 months elapse after the cartridge has been removed from its package, or if the print quality does not improve even after cleaning the head over five times, replace the ink cartridge.

Furthermore, if the print quality does not improve following replacement of the ink cartridge and after cleaning is performed over 5 times, replace the BJ cartridge. Since the three color Inks are integrated, when one ink color runs out, the entire color ink cartridge must be replaced.

When drop modulation technology is used, small dots are printed in low density areas to minimize the graininess and large dots are used for high density areas. Using this technology allows the printer to retain its printing speed and achieve high quality printing.

The first 24 nozzles are for yellow ink, the second 24 for magenta, the third 24 for cyan, and the remaining 64 nozzles are for black. A total of 136 nozzles are lined in a vertical.

About 160 sheets (in HQ mode with 1500-character pattern) can be printed with the black ink and about 90 sheets (in HQ mode, 7.5% duty per color pattern) with the color inks. On plain paper and transparencies, 360 dpi/720 dpi high-resolution printing is available.

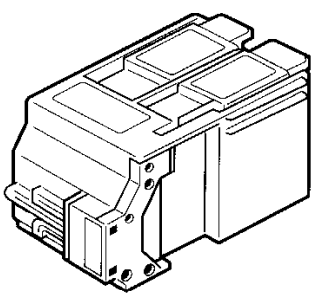


Figure 2-2 Color BJ Cartridge (Multi Drop)

1.3.2 Black BJ cartridge

The disposable BJ cartridge is used for ultra-high-speed mono-color printing. Its head has a 128 nozzle.

When the ink runs out or more than 6 months elapse after the cartridge is removed from its package or if the print quality does not improve even after cleaning the head over five times, replace the BJ cartridge.

This cartridge is capable of printing about 700 sheets (in HQ mode with 1500 characters per page).

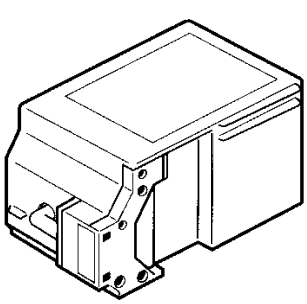


Figure 2-3 Black BJ Cartridge

1.3.3 Photo BJ Cartridge (Multi Drop)

he disposable photo BJ cartridge used for printing color photographs, integrates a 136-nozzle print head and four ink cartridges.

When the ink runs out or more than 6 months elapse after the cartridge has been removed from its package, or if the print quality does not improve even after cleaning the head over five times, replace it with a new photo BJ cartridge. Since the four color inks are integrated, when one ink color runs out, the entire photo BJ cartridge must be replaced. Adopting drop modulation technology, the photo BJ cartridge prints small dots in low density areas to minimize the graininess and large dots in high density areas to retain its printing speed and achieve high quality printing.

The first 24 nozzles are for yellow ink, the second 24 for magenta, the third 24 for cyan, and the remaining 64 nozzles are for black. A total of 136 nozzles are lined in a vertical. About 50 sheets (in Photo mode) can be printed.

Use high quality special paper and Canon original printer driver for printing.

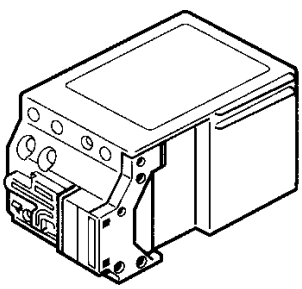


Figure 2-4 Photo BJ Cartridge (Multi Drop)

1.4 BJ Cartridge Container

The cartridge container is for storing unused BJ cartridges black, color and photo to protect the head from damage. When storing a BJ cartridge in this container, be sure to close the cover. When storing a color BJ cartridge, do not remove the ink cartridges. The BJ cartridge containers can be linked together

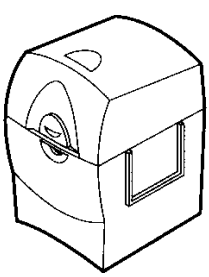


Figure 2-5 BJ Cartridge Container

1.5 AC Adapter

The AC adapter supplies DC power (5 VDC and 24 VDC) to operate the printer.

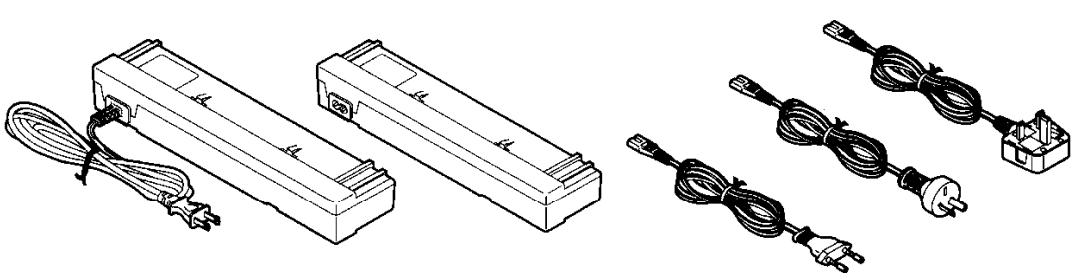
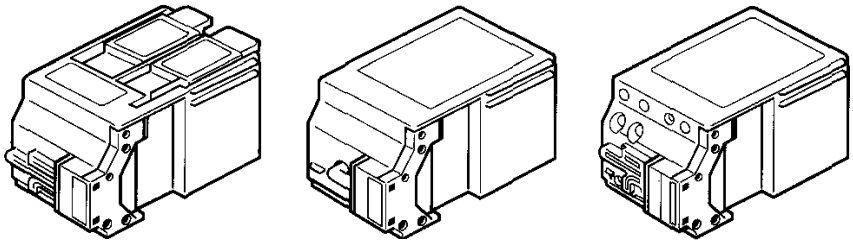


Figure 2-6 AC Adapter

1.6 Consumables

1.6.1 BJ cartridges (Color, Black, Photo)

Replacement BJ cartridges are identical to those included with the printer.



Color BJ Cartridge Black BJ Cartridge Photo BJ Cartridge

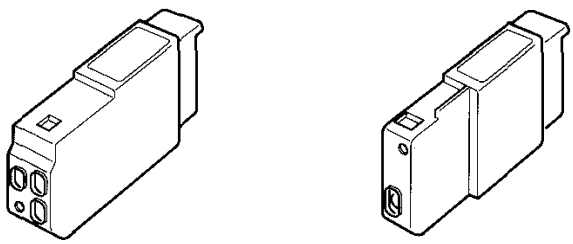
Figure 2-7 BJ Cartridges

1.6.2 Ink cartridge (Color BJ cartridge)

Replacement ink cartridges are the same as those installed in the color ink cartridge and black ink cartridge. Either cartridge can be used for half a year after the seal is opened.

Numbers of sheets printed

Color ink cartridge: Approximately 90 sheets (HQ mode) (7.5% duty per color pattern)
Black ink cartridge: Approximately 160 sheets (HQ mode) (1500 characters)



Color Ink Cartridge Black Ink Cartridge

Figure 2-8 Ink Cartridges

1.7 Option

1.7.1 Color Image Scanner Cartridge

This printer can be used as a color scanner when a scanner cartridge is installed. The scanner cartridge is a replaceable scanner unit that uses a one-line 128 pixel CCD. The scanner separates each of the three RGB colors of the LED by scanning the same line three times. The color image is output by 8-bit signals (256 gradation in each RGB primary color). For a monochrome image, the image is lit with a green LED and scanned once to output either a 8-bit or 2-bit signal. The maximum scanning resolution is 360 dpi x 360 dpi.

To stabilize LED output, the printer preheats and warms the scanner cartridge when the installed scanner cartridge remains at rest or scanning is not performed.

White calibration must be conducted using the white calibration sheet when white balance and shading correction is performed. White balance correction is needed to correct the uneven density in the horizontal direction caused by variation of LED. Shading correction is needed to correct the uneven distribution of light transmitted through the center and the periphery of the lenses. Density variation between each vertical scanning line caused by the varying sensitivities of the CCD pixels, is also corrected.

The calibration data is retained unless there is an ambient temperature change of ±5°C or the cartridge is removed and reinstalled.

Also for monochrome printing, edge emphasis processing is performed.

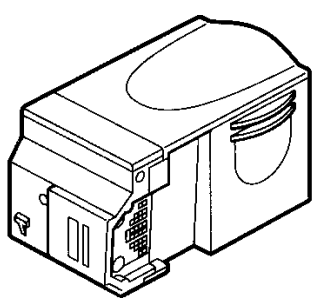


Figure 2-9 Scanner Cartridge

1.7.2 Scanning Holder

The scanning holder protects the scanning document from the printer's sharp spurs that may damage the document during feeding. Small documents can also be scanned using the scanning holder. When the printer is used as a scanner, the scanning holder must be used at all times.

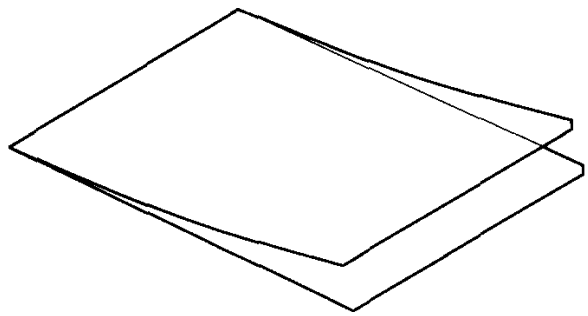


Figure 2-10 Scanning Holder

1.7.3 White Calibration Sheet

The printer uses a white calibration sheet to perform calibration. The white calibration sheet is set on the printer similar to the scanning holder. White calibration is performed in the initial setting of the printer driver. As the white calibration sheet is used to set the white standard value for scanning images, scanning input data may be affected if the sheet is dirty. Without damaging the sheet, use a soft moistened cloth to gently wipe off the dirt If the sheet is still dirty, use a wet towel to wipe the sheet and dry it thoroughly before use.

2. SPECIFICATIONS

2.1 Printer Specifications

1. Type

Desk-top serial color bubble jet printer

2. **Paper feeding method**

Auto feeding and manual feeding

3. **Cut Sheet Feeder capacity**

Plain paper: Maximum 10 mm (approximately 100 pages of 64g/m² paper)
Envelopes: 10 envelopes (Commercial number 10 and DL)
Transparencies: 50 sheets
BPF: 10 sheets
Glossy film/ BJ cloth: One page with the manual feeding
Scanning document: Place between the scanning holder. One page with the ASF.

4. **Manual feeding slot capacity**

One sheet

5. Paper weight

Automatic feed / Manual feeding slot: 64 to 105 g/m² (17 lbs to 28 lbsl

6. Printing **speed**

Burst

	Color BJ Cartridge (Black printing)	Black BJ Cartridge (Black printing)
HQ mode	173 cps (10 cpi)	346 cps (10 cpi)
HS mode	255 cps (10 cpi)	510 cps (10 cpi)

7. Printing direction

Unidirectional
(Print direction is automatically changed according to optimum printing directional control.)

8. Printing width

Maximum 8"

9. Line feed speed

150 ms/line (2/6" line]

10. Built-in printing control modes

LQ mode: Epson LQ-2550 emulation
BJ mode: IBM Proprinter X24E emulation
[Canon extended mode is supported when the Canon driver is used.)

11. Line feed pitch (n: programmable)

LQ mode: 1/6", 1/8", n/60", n/72", n/180", n/216", and n/360"
BJ mode: 1/6", 1/8", n/180", and n/360"

11. Printing characters

Typefaces:	LQ&BJ mode	Roman, Gothic, Courier, prestige, Script, Draft
Pitch:	LQ mode	10, 12. 15, 17, 20 cpi, and PS
	BJ mode	10, 12, 17 cpi ,and PS
Character matrix:	HQ mode	36 (H) x 48 (V) dots
	HS mode	18 out of 36 (H) x 48 (V) dots
Character set:	LQ mode	Italic character set and Graphic character set and International character set
	BJ mode	IBM character set 1, 2 and all character set (code page 437,850, 852 860,863 and 865)

12. Number **of columns** printed

	Mode	Pitch		cpl *
LQ mode	10 cpi	10	cpi	80 cpl
	10 cpi doublewide	5	cpi	40 cpl
	10 cpi condensed	17	cpi	136 cpl
	10 cpi condensed-doublewide	8.5	cpi	68 cpl
	12 cpi	12	cpi	96 cpl
	12 cpi doublewide	6	cpi	48 cpl
	12 cpi condensed	20	cpi	160 cpl
	12 cpi condensed-doublewide	10	cpi	80 cpl
	15 cpi	15	cpi	120 cpl
	15 cpi doublewide	7.5	cpi	60 cpl
	Proportional spacing	PS		Varies
BJ mode	10 cpi	10	cpi	80 cpl
	10 cpi doublewide	5	cpi	40 cpl
	10 cpi condensed	17	cpi	136 cpl
	10 cpi condensed-doublewide	8.5	cpi	68 cpl
	12 cpi	12	cpi	96 cpl
	12 cpi doublewide	6	cpi	48 cpl
	Proportional spacing	PS		varies

* cpl: characters per line

13. Bit image

Vertical: 8.24 and 48 dots

Horizontal: 60, 120, 180, 240,360 and 720* dpi

* In smoothing mode or when using the Canon driver.

14. **Buffer**

	Receive buffer	Download buffer
LQ mode	22 kB	32 kB
BJ mode	22 kB	0 kB

15. Interface

IEEE1284 compatible parallel interface

16. BJ cartridge

Color BJ cartridge (Multi Drop)

Type: Color BJ cartridge with replaceable ink cartridges

Print head: 136 nozzles (vertically-lined) Bk (64 nozzles) + Y, M, C (24 nozzles x 3)

Ink colors: Black, cyan, magenta, yellow

Service life:

Approximately 160 pages (in the HQ mode with 1500 character pattern) with a black cartridge

Approximately 90 pages (in the HQ mode) with a color cartridge (7.5% duty per color pattern)

Weight: Approximately 85 g (3.0 oz) [including black and color ink tanks)

Black BJ cartridge

Type: Black BJ cartridge with integrated ink

Print head: 128 nozzles (vertically-lined)

Ink color: Black

Service life: Approximately 700 pages (in the HQ mode): cartridge

Weight: Approximately 85 g (3.0 oz)

Photo BJ cartridge [Multi Drop)

Type: Color BJ cartridge with integrated ink

Print head: 136 nozzles (vertically-lined) Bk (64 nozzles) + Y, M, C (24 nozzles x 3)

Ink colors: Black, cyan, magenta, yellow

Weight: Approximately 74 g 12.8 oz)

17. Sensor functions

Paper out: Provided

Installation of cartridge: Provided

BJ cartridge/Scanner cartridge identification: Provided

Waste ink amount: Provided

Ink out: None

Paper width: None

18. Acoustic noise level

Approximately 45dB IA)/ HQ (Sound pressure level: According to IS0 9296)

19. Ambient conditions

	During operation	During storage
Temperature	5°C to 35°C (41°F to 95°F)	0°C to 35°C (32°F to 95°F)
Humidity	10% to 90%RH (no condensation)	5% to 95%RH (no condensation)

20. Power source

	Voltage/Frequency	Power consumption	Stand-by status
USA/Canada	AC 120V 60 Hz	Max. 30 W	Max. 4 W
UK/Australia	AC 240V 50 Hz		
Europe	AC 230V 50 Hz		

21. Dimensions

383 mm W × 231.6 mm D × 203 mm H

22. Weight

Approximately 3.5 kg (7.7 lbs) (including BJ cartridge)

2.2 Scanner Cartridge Specifications (Option)

1.Type

Cartridge replacement type color scanner

2. Image **sensor**

128 pixel in one line of CCD

3. Light **source**

3-color LED (RGB), (alignment of red, green, blue, green, red ; five in total)
Using green LED for monochrome printing

4. Scanning method

Sequential RGB light source switching method

5. Scanning direction

Unidirectional

6. Picture **signal** output

Color 8bit (256 gradation for each of RGB colors), Binary. Grayscale 8bit

7. Resolution

Carriage scanning direction; 360/300/200/180/90 dpi
(300/200dpi are the resolution change from the software)
Paper feed direction: 360/180/90 dpi

8. **Scanning speed** (reference exclude **paper** pickup/ delivery and data **transfer** time)

Color, 8bit, ECP, A4:
4'31" (360 x 360 dpi), 2'56" (180 x 180 dpi), 2'31" (90 x 90 dpi]
Monochrome, lbit, ECP, A4:
0'34" (360 x 360 dpi), 0'29" (180 x 180 dpi), 0'25" (90 x 90 dpi)

9. **Interface**

ECP/Nibble

10. Document feeding method

Place the document between the scanning holder and feed it through ASF.

11. Calibration

Scanning the white calibration sheet corrects the shading and white balance

12. **Edge stress**

Edge stress processing only applies to monochrome binary

13. **Power consumption**

Approx. 1.6 W

14. **External dimensions**

43.8 mm (W) x 41.8 mm (D) x 72.2 mm (H)

15. Weight

Approx. 60 g (2.1 oz)

2.3 Paper Specifications

2.3.1 Paper size

Letter (8.5" x 11")
Legal (8.5" x 14")
A5 (148 mm x 210 mm)
A4 (210 mm x 297 mm)
Commercial number 10 envelope (9.5" x 4.1")
European DL-size (220 mm x 110 mm)

2.3.2 Paper type (Recommended)

Plain paper
Bubble jet paper (Canon LC-301)
Coated paper (Canon coated paper LC-101)
Envelope (Commercial number 10 or European DL)
Transparencies (Canon transparency film CF- 102)
BPF (Canon back print film BF- 102)
Glossy photo paper (Canon glossy paper GP-201)
High gloss paper [Canon high gloss Film HG- 10 1)
Fabric (Fabric sheet FS- 10 1)
Banner (Banner paper)

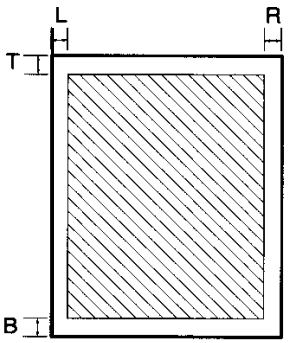
2.3.3 Print paper

Media	Thickness Lever		Paper Feed		Flap
	Black	**Color/Photo**	Method	Limit	**Position**
Plain paper	Left	Center	Sheet feeder	10 mm	Flat
High resolution paper	Center		Sheet feeder	10 mm	Upright
Envelopes	Right		Sheet feeder	10	Flat
Transparencies	Center		Sheet feeder	50 sheets	Upright
Back print film	Center		Sheet feeder	10 sheets	Upright
Glossy photo paper	Center		Sheet feeder	1 sheet	Upright
Banner paper	Right		Sheet feeder	1 sheet	Upright
Fabric sheet	Right		Sheet feeder	1 sheet	Upright
High gloss film	Center		Manual feed slot	1 sheet'1	Upright

2.3.4 Printing range

1) Plain paper and special media

The shaded portion in the diagram below shows the printable area and recommended printing area for paper and special media.



*Feed direction

Printable Area

Minimum
L 3.4 mm 0.13"*1
R 3.4 mm 0.13"
T 3.0 mm 0.12"
B 7.0 mm 0.27"

Recommended Printing Area

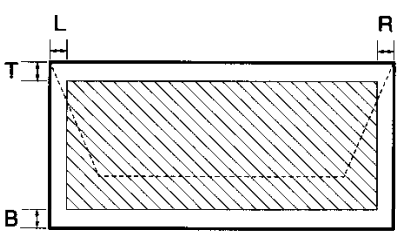
Minimum
L 3.4 mm 0.13"*1
R 3.4 mm 0.13"
T 20.5 mm 0.81"
B 20.5 mm 0.81"

*1:LTR is selected in the BJ setup utility pogram, L is 6.4mm(0.25") minimum.

Figure 2-11 Printing Area

2) Envelope

The shaded portion in the diagram below shows the printable area and recommended printing area for U.S. Commercial 10 envelopes (9.5 X 4.1 inches) and European DL-size envelopes (229 X 110 mm).



Printable Area

Minimum
L 6.4 mm 0.25"
R 10.4 mm 0.41"*1
T 3.0 mm 0.12"
B 7.0 mm 0.27"

Recommended Printing Area

Minimum
L 6.4 mm 0.25"
R 10.4 mm 0.41"*1
T 20.5 mm 0.61"
B 20.5 mm 0.61"

*1:For Commercial number 10 envelopes,31.4mm(1.2").

Figure 2-12 Printing Area (Envelope)

2.4 Interface Specifications

The parallel interface sends 8 bits (one byte) of data at a time and is transistor-transistor-logic (TTL) compatible.

The interface cable must be constructed of American Wire Gauge (AWG) No. 28 or larger. The maximum length of the twisted-pair shielded cable must be 2.0 m (approximately 6.6 feet).

1) Interface Type

IEEE1284 compatible parallel interface

2) **Data transfer**

8-bit parallel interface

3) Signal **voltage levels**

Low: 0.0 v to +0.8 V

High: +2.4 V to +5.0 V

4) **Input/ output**

Each signal pulled up with +5V.

5) Interface cable

Type: Twisted-pair double shielded cable

Material: AWG#28 or larger

Length: Up to 2.0 m (6.6 feet)

6) Interface connectors

On printer: Amphenol 57-40360 (or equivalent)

On cable: Amphenol 57-30360 (or equivalent)

7) Input/ output signals and pin layout

Compatible mode

No.	Signal	I/O	No.	Signal	I/O
1	$\overline{\text{STROBE}}$	IN	19	$\overline{\text{STROBE-RET}}$*1	
2	DATA1	IN	20	DATA1-RET	....
3	DATA2	IN	21	DATA2-RET	
4	DATA3	IN	22	DATA3-RET	...
5	DATA4	IN	23	DATA4-RET	
6	DATA5	IN	24	DATA5-RET	
7	DATA6	IN	25	DATA6-RET	
8	DATA7	IN	26	DATA7-RET	
9	DATA8	IN	27	DATA8-RET	.
10	$\overline{\text{ACKNLG}}$	OUT	28	ACKNLG-RET	
11	BUSY	OUT	29	BUSY-RET	
12	P.E.	OUT	30	P.E.-RET	
13	SELECT	OUT	31	$\overline{\text{INIT}}$	IN
14	AUTO FEED $\overline{\text{XT}}$*4	IN	32	$\overline{\text{ERROR}}$	OUT
15	N.C*2		33	GND	
16	$\overline{\text{INIT}}$	IN	34	N.C*2	...
17	GND		35	+5.0V*3	.
18	N.C*2		36	$\overline{\text{SELECT IN}}$*4	IN

* 1. All-RETs are connected to GND.

'2. N.C means no connection.

*3. The level is pulled up with +5.0V through 5.6kΩ resistor.

*4. These signals are effective only in LQ printer control mode.

Nibble mode

No.	Signal	I/O	No.	Signal	I/O
1	HostClk	IN	19	Signal Cnd	
2	Data1	IN/OUT	20	Signal Gnd	..
3	Data2	IN/OUT	21	Signal Gnd	
4	Data3	IN/OUT	22	Signal Gnd	
5	Data4	IN/OUT	23	Signal Gnd	
6	Data5	IN/OUT	24	Signal Gnd	
7	Data6	IN/OUT	25	Signal Gnd	..
8	Data7	IN/OUT	26	Signal Gnd	
9	Data8	IN/OUT	27	Signal Gnd	
10	PtrClk	OUT	28	Signal Gnd	
11	PtrBusy	OUT	29	Signal Gnd	
12	AckDataReq	OUT	30	Signal Gnd	...
13	Xflag	OUT	31	Init	IN
14	HostBusy	IN	32	DataAvail	OUT
15	N.C."		33	N.C.*1	
16	Gnd		34	N.C.*1	...
17	Gnd		35	N.C.*1	..
18	VCC		36	1284Active	IN

*1: N.C. [Non Connection]

ECP mode

No.	Signal	I/O	No.	Signal	I/O
1	HostClk	IN	19	Signal Gnd	
2	Data 1	IN/OUT	20	Signal Gnd	
3	Data2	IN/OUT	21	Signal Gnd	
4	Data3	IN/OUT	22	Signal Gnd	
5	Data4	IN/OUT	23	Signal Gnd	
6	Data5	IN/OUT	24	Signal Gnd	
7	Data6	IN/OUT	25	Signal Gnd	...
8	Data7	IN/OUT	26	Signal Gnd	
9	Data8	IN/OUT	27	Signal Gnd	...
10	PeriphClk	OUT	28	Signal Gnd	
11	PeriphAck	OUT	29	Signal Gnd	...
12	AckReverse	OUT	30	Signal Gnd	
13	Xflag	OUT	31	ReverceReq	IN
14	HostAck	IN	32	PeriphReq	OUT
15	N.C.		33	N.C.*1	...
16	Gnd		34	N.C.*1	
17	Gnd		35	N.C.*1	
18	Vcc		36	1284Active	IN

*1: N.C. [Non Connection]

8) Input/ output signals:

Compatible Mode

STROBE [Input]

This signal is used to read DATA1 to DATA8. The signal becomes valid after BUSY signal goes Low and the printer outputs an ACKNLG signal. The host computer does not send the next signal until it receives ACKNLG signal. It is normally High, after becoming Low. the printer receives data. When the signal remains Low, the printer does not operate until it goes High.

DATA1 to 8 [Input]

The printer receives data with the STROBE signal. The state of each bit of the signal must be maintained for at least 0.5 µs from the rising edge of the STROBE signal.

ACKNLG [Output]

This signal is a response signal to the STROBE signal. The host computer does not send the next STROBE signal until this signal is sent. When the power is turned on or the BUSY signal goes Low for the input of the INIT signal, this signal is sent regardless of the STROBE signal.

BUSY [Output]

When this signal is High. the printer is BUSY; when Low, the printer is READY. The signal goes high when data is received, when the printer is offline, or when an error occurs (paper-out, paper jam).

P.E. [Output]

When the printer cannot feed paper, this signal goes High. Then BUSY signal goes High and the SELECT and FAULT signals go Low. The signal goes Low when the paper is set and the printer goes online. FAULT and SELECT signals then go High from Low. If paper is not ejected [paper Jam) by executing a paper eject command. this signal and BUSY signal go High, and SELECT and FAULT go Low. In this case, the signals do not change even if the paper is ejected.

SELECT [Output]

The printer is SELECT when this signal is High. The printer is DESELECT when this signal is Low. This signal goes Low when the printer is offline, when an error occurs (paper-out, paper jam, head error, etc.).

AUTO FEED XT [Input] (Valid in LQ mode)

When this signal is Low, automatic line feed mode (Carriage Return and Line Feed) is effective.

The printer judges the level of this signal only when it is turned on or is initialized by the INIT signal.

INIT [Input]

INIT from the system resets the printer to its initial power-on state. In BJ mode, the BUSY line goes high, and any received data is printed. In LQ mode. the BUSY line goes high, and the print buffer is cleared. When INIT goes low. it resets the printer to the power-on default state.

FAULT [Output]

This signal goes Low when the printer is in an error state [paper-out, paper jam, etc.).

SELECT IN [Input] (Valid in LQ mode)

When this signal is High, the DC1 and DC3 codes are valid: When Low. they are invalid. The printer Judges the level of this signal when it is turned on or is initialized by the INIT signal.

Nibble Mode

Host Clk [Input]

STROBE signal to read DATA 1 to DATA 8.

Negotiation phase:

Trigger signal to send the protocol confirmation to the printer.

DATA 1-8 [Input]

The printer receives data with the Host Clk signal.

The state of each bit of this signal must be maintained for at least 0.5 µs from the rising edge of the Host Clk signal.

Ptr Clk [Output]

Reverse data transmission phase:

The printer requests the host computer to read the data by making the Ptr Clk Signal Low. After finishing reading, the host computer notifies peripheral equipment of completion of data receiving by making the Host Busy signal High.

Ptr Busy [Output]

Reverse data transmission phase:

Indicates bit 3 and bit 7 of the transmission data.

Ack Data Req [Output]

*Reverse data transmission phase:

Indicates bit 2 and bit 6 of the transmission data.

*Negotiation phase:

Trigger signal to inform the host computer of the printer's condition [whether it supports nibble mode or not, whether there is reverse transmission data or not).

Xflag [Output]

*Reverse data transmission phase:

Indicates bit 1 and bit 5 of the transmission data.

*Negotiation phase:

Informs the host computer whether the printer supports nibble mode or not, synchronizing with the falling edge of the Ack data Req signal. "L" means that it supports nibble mode.

Host Busy [Input]

*Reverse data transmission phase:

Indicates that the host is ready to receive the data from the printer by making the Host Busy signal Low. After that, it goes high to synchronize with the Low pulse of Ptr Clk signal to verify receiving data.

*Reverse idle phase:

The Host Busy signal goes high in response to the Low pulse of the Ptr Clk signal, and enters the reverse data transmission phase again.

INIT [Input]

When this signal becomes "L", the printer's state becomes BUSY. When the signal changes from "L" to "H", it resets the printer control system to the initial state.

This signal is normally "H" and the pulse width must be at least 0.5 µs at the printer side.

After initializing, the printer enters compatible mode.

DataAvail [Output]

*Reverse data transmission phase:

Indicates bit 0 and bit 4 of the transmission data.

*Negotiation phase:

Informs the host computer if there is reverse transmission data or not to synchronize with the falling edge of the Ack Data Req signal. "L" means that there is reverse transmission data.

1284 Active [Input]

This signal confirms that the printer is a 1284 compatible device when 1284 Active signal goes High and Host Busy signal goes Low. It goes Low with the termination phase.

ECP Mode

Host Clk [Input]

This signal handshakes with the PeriphAck signal when data is transferred form the host computer to the printer. A Low Host Clk signal indicates that data has been output along the data buses (Data1-8).

The signal goes High as a response to a High PeriphAck signal. It remains High during reverse data transmission.

Data 1-8 [Input/Output]

This signal is an input signal when data is transferred from the host computer to the printer. During reverse data transmission, this is an output signal and the printer uses this data bus to send data to the host computer.

Periph Clk [Output]

When data is transferred from the printer to the host computer, this signal remains High. Periph Clk signal is lowered during reverse transmission phase and indicates that data has been sent to the host computer. This signal is also High in response to the High HostAck signal from the host computer.

Perlph Ack [Output]

Periph Ack signal goes Low when the printer is ready to receive data from the host computer. Once the data is received the signal goes High. During the reverse data transmission phase, this signal indicates whether the data sent from the printer to the data bus was a “command” or “data”.

Low: “Command”, High: “Data”

Ack Reverse [Output]

Ack Reverse signal remains High when data is transferred from the host computer to the printer. During the reverse data transmission phase, the signal remains Low.

The Reverse Request signal from the host computer goes Low to request a switch from the forward data transmission phase to the reverse data transmission phase. In response to the Low Reverse Request signal, Ack Reverse signal goes low to indicate that the request was accepted.

When the Reverse Request signal from the host computer goes High to request a switch from the reverse data transmission phase to forward data transmission phase, Ack Reverse signal goes high to indicate the switch over request has been accepted.

X flag [Output]

This signal remains High in ECP mode.

Host Ack [Input]

This signal indicates the nature of the signal along the data bus when data is transferred from the host computer to the printer. A Low Host Ack indicates a “command” whereas a High Host Ack indicates a “data”.

During reverse data transmission, this signal handshakes with the Periph Clk signal. When the host computer is ready to accept data from the printer, this signal goes Low. After data is received the signal goes High.

Reverse Req [Input]

This signal goes Low when the recovery process (data re-transmission) is taking place during data transmission from the host computer to the printer.
In response to a Low Ack Reverse signal, Reverse Req signal goes High.
When switching from the idle state of the forward data transmission phase to the reverse data transmission phase, i.e. data is transferred from the printer to the host computer, this signal goes Low.
The Low period indicates it is in the reverse data transmission phase.
When the reverse data transmission phase is switched to the forward data transmission phase, this signal goes High.

Periph Req [Output]

If the printer requests reverse data transmission during the forward data transmission, this signal goes Low. When the host computer switches over from the forward data transmission phase to the reverse data transmission phase, together with the Ack Reverse signal, the Periph Req signal goes High in response to the host computer's Low Reverse Request signal.

1284 Active [Input]

During the negotiation phase, this signal goes High and remains High during ECP mode to indicate bidirectional operation.
After ending the ECP mode, this signal goes Low and enter the termination phase.

9) Timing

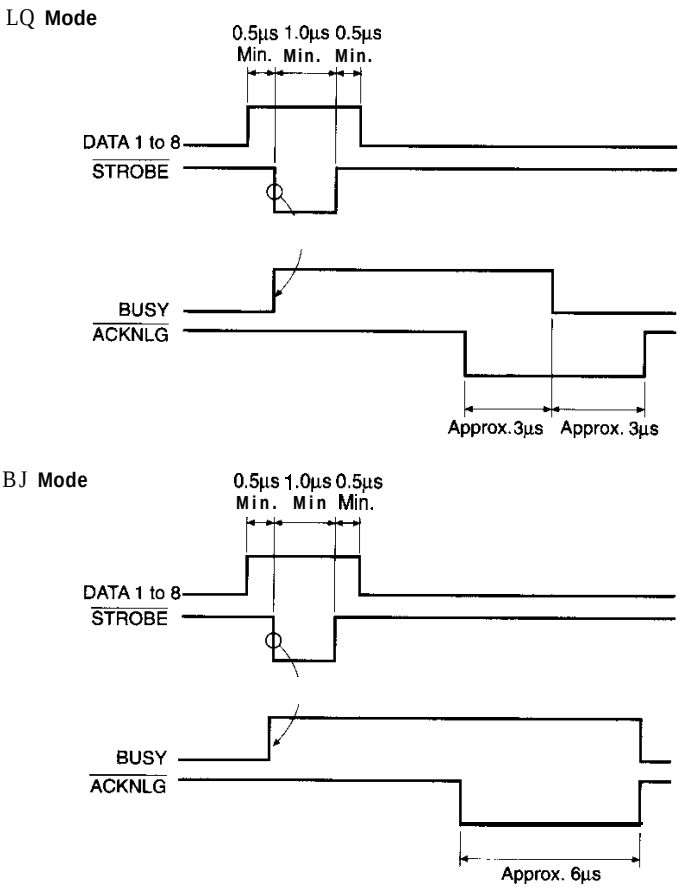


Figure 2-13 Timing Chart (Compatible Mode)

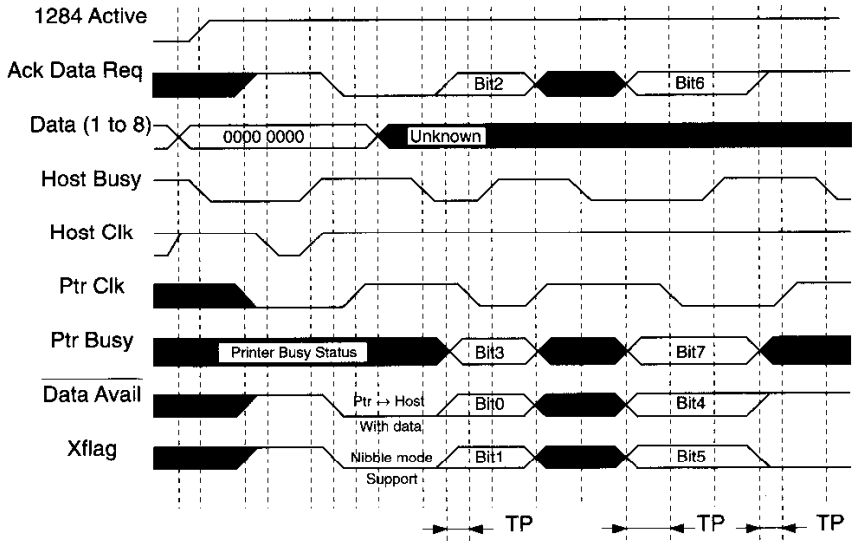


Figure 2-14 Timing Chart (Nibble Mode)

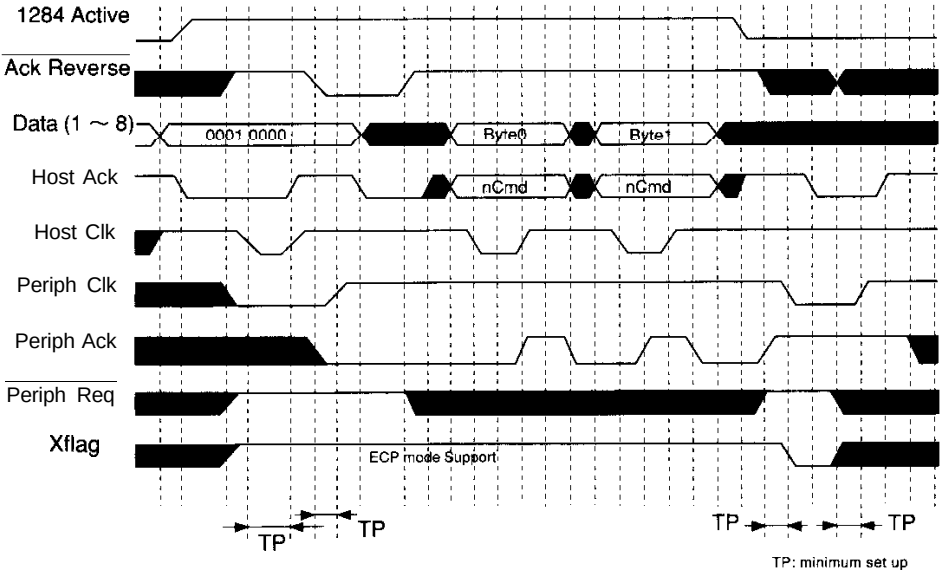
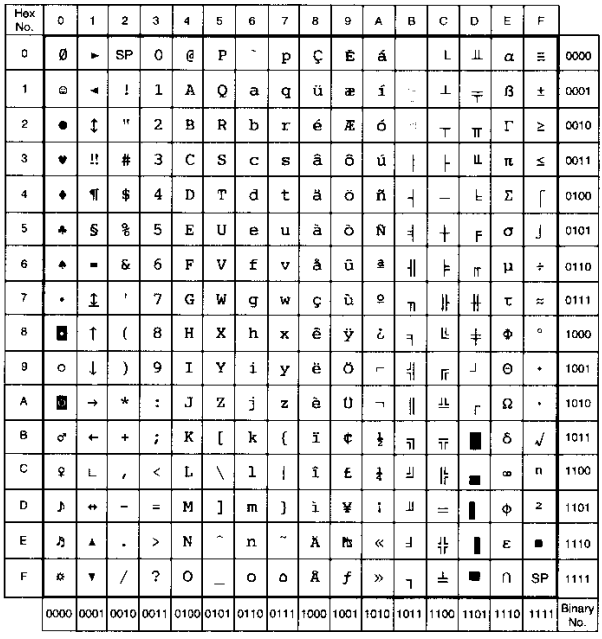


Figure 2-15 Timing Chart (ECP Mode)

2.5 Character Code Tables

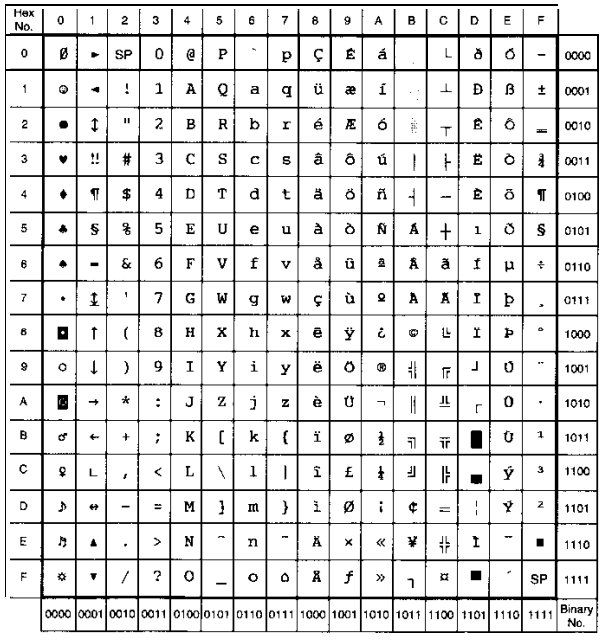
2.5.1 BJ mode

a) USA Code page 437



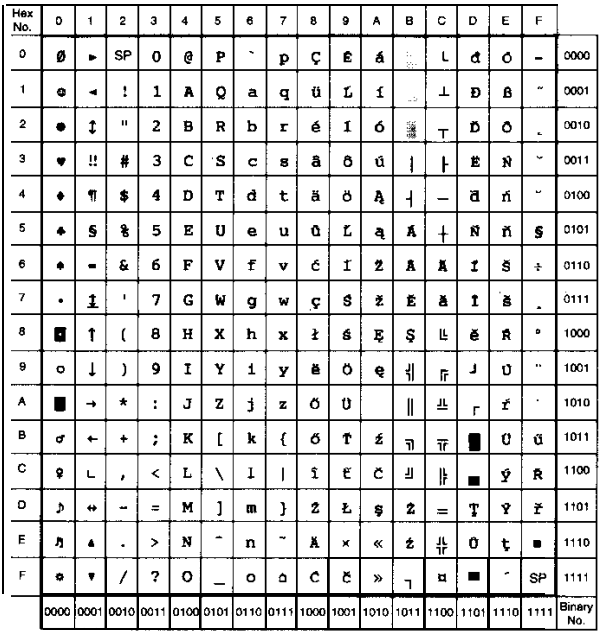
Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á		L	⊥	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	æ	í		⊥	⊤	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	Æ	ó		⊤	⊤	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	┤	├	⊥	π	≤	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	├	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╞	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√	1011
C	♀	∟	,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²	1101
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

b) Multilingual Page 850



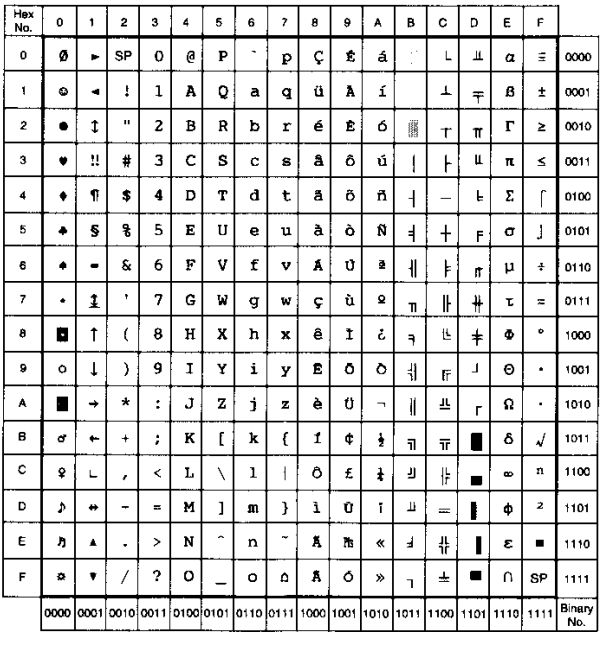
Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á		L	ð	Ó	-	0000
1	☺	◄	!	1	A	Q	a	q	ü	æ	í		⊥	Ð	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	Æ	ó		⊤	Ê	Ô	‗	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	┤	├	Ë	Ò	¾	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§	0101
6	♠	▬	&	6	F	V	f	v	å	û	ã	Ã	ã	Í	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	õ	Â	Â	Î	þ	¸	0111
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	╩	╩	┌	Û	·	1010
B	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹	1011
C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³	1100
D	♪	↔	-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²	1101
E	♫	▲	.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■	1110
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	¤	■	´	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

c) Turkish Code Page 852



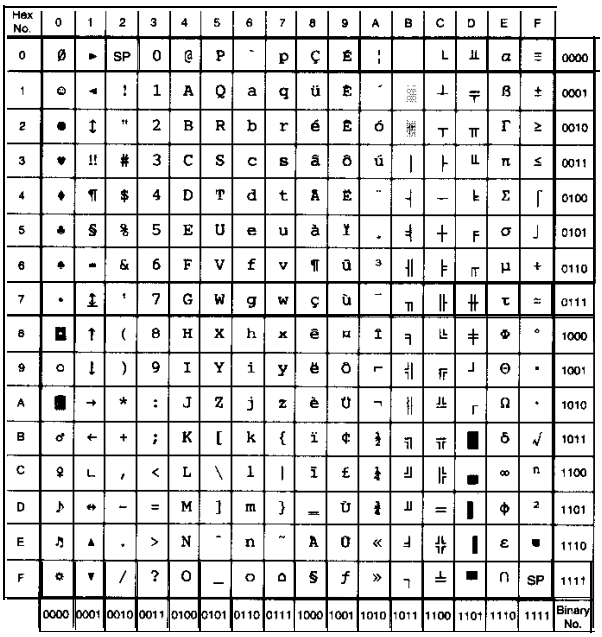
Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á	▒	└	đ	Ó	-	0000
1	☺	◄	!	1	A	Q	a	q	ü	Ĺ	í	▓	┴	Đ	ß	˝	0001
2	☻	↕	"	2	B	R	b	r	é	Í	ó	▓	┬	Ď	Ô	˛	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	¦	├	Ë	Ń	ˇ	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	Ą	┤	─	ď	ń	˘	0100
5	♣	§	%	5	E	U	e	u	ů	Ľ	ą	Á	┼	Ň	ň	§	0101
6	♠	▬	&	6	F	V	f	v	ć	ľ	Ž	Â	Ă	Í	Š	÷	0110
7	•	↨	'	7	G	W	g	w	ç	Ś	ž	Ě	ă	Î	š	¸	0111
8	◘	↑	(	8	H	X	h	x	ł	ś	Ę	Ş	Ľ	ě	Ř	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	ę	Ľ	╔	┘	Ú	¨	1001
A	■	→	*	:	J	Z	j	z	ő	Ü		‖	╩	┌	ŕ	·	1010
B	♂	←	+	;	K	[	k	{	ő	Ť	ź	╗	╦	▌	Ű	ű	1011
C	♀	└	,	<	L	\	l	|	î	Ě	╝	╠	▄	Ý	Ř	1100
D	♪	↔	-	=	M	]	m	}	Z	Ł	ş	Ż	═	Ţ	ý	ř	1101
E	♫	▲	.	>	N	^	n	~	Ä	×	«	ź	╬	Ů	ţ	■	1110
F	☼	▼	/	?	O	_	o	⌂	Ć	č	»	┐	¤	■	´	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

d) Portuguese Code Page 860



Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	À	í	▓	┴	╤	ß	±	0001
2	☻	↕	"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	¦	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	Á	Ù	ª	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	Ê	Õ	Ò	╣	╔	┘	Θ	·	1001
A	■	→	*	:	J	Z	j	z	è	Ü	¬	‖	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	Í	¢	½	╗	╦	▌	δ	√	1011
C	♀	└	,	<	L	\	l	|	Ô	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	ì	Ù	ï	╜	═	▌	φ	2	1101
E	♫	▲	.	>	N	^	n	~	Ã	ñ	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	Ã	Ó	»	┐	±	■	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

e) Canadian French Code Page 863



Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
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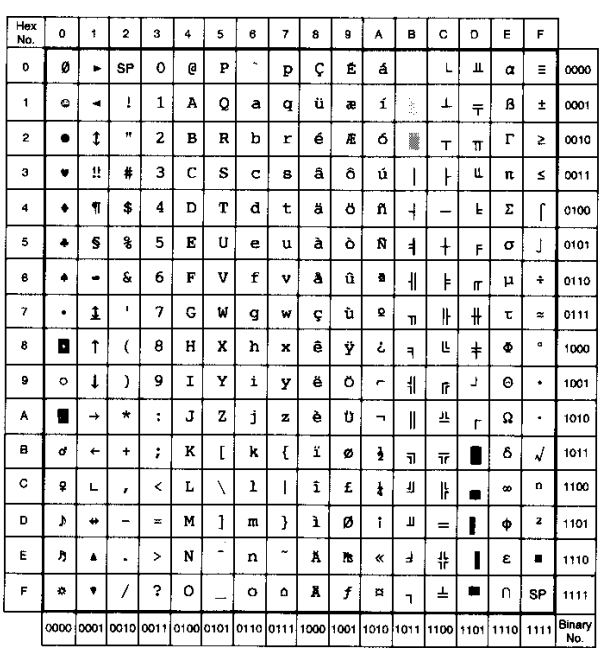
1	☺	◄	!	1	A	Q	a	q	ü	È	´	▒	┴	╤	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	Ê	ó	▓	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	À	Ë	¨	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	Ï	¸	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	¶	û	³	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	¯	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	¤	î	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ô	⌐	╣	╔	┘	Θ	·	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√	1011
C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	_	Ù	¾	╜	═	▌	φ	²	1101
E	♫	▲	.	>	N	^	n	~	À	Û	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	§	ƒ	»	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

f) Norwegian Code Page 865



Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á		└	╨	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	·	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	δ	√	1011
C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	ì	Ø	¡	╜	═	▌	φ	²	1101
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	¤	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

2.5.2 EPSON mode

a) Epson Italics Character Set

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	NUL		SP	0	@	P	`	p	NUL		SP	*0*	*@*	*P*	`	*p*	0000
1		DC1	!	1	A	Q	a	q		DC1	!	*1*	*A*	*Q*	*a*	*q*	0001
2		DC2	"	2	B	R	b	r		DC2	"	*2*	*B*	*R*	*b*	*r*	0010
3		DC3	#	3	C	S	c	s		DC3	#	*3*	*C*	*S*	*c*	*s*	0011
4		DC4	$	4	D	T	d	t		DC4	$	*4*	*D*	*T*	*d*	*t*	0100
5			%	5	E	U	e	u			%	*5*	*E*	*U*	*e*	*u*	0101
6			&	6	F	V	f	v			&	*6*	*F*	*V*	*f*	*v*	0110
7	BEL		'	7	G	W	g	w	BEL		'	*7*	*G*	*W*	*g*	*w*	0111
8	BS	CAN	(	8	H	X	h	x	BS	CAN	(	*8*	*H*	*X*	*h*	*x*	1000
9	HT	EM	)	9	I	Y	i	y	HT	EM	)	*9*	*I*	*Y*	*i*	*y*	1001
A	LF		*	:	J	Z	j	z	LF		*	:	*J*	*Z*	*j*	*z*	1010
B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	*K*	*[*	*k*	*{*	1011
C	FF		,	<	L	\	l	¦	FF		,	<	*L*	\	*l*	*¦*	1100
D	CR		-	=	M	]	m	}	CR		-	=	*M*	*]*	*m*	*}*	1101
E	SO		.	>	N	^	n	~	SO		.	>	*N*	^	*n*	~	1110
F	SI		/	?	O	_	o	DEL	SI		/	?	*O*	_	*o*	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

b) Epson Graphics Character Set

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡	0000
1		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±	0001
2		DC2	"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥	0010
3		DC3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤	0011
4		DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠	0100
5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷	0110
7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°	1000
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•	1001
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√	1011
C	FF		,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	n	1100
D	CR		-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²	1101
E	SO		.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■	1110
F	SI		/	?	O	_	o	DEL	Å	ƒ	»	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

c) International Character Set

Country \ Hex / Dec		23 35	24 36	40 64	5B 91	5C 92	5D 93	5E 94	60 96	7B 123	7C 124	7D 125	7E 126	A3 163	A4 164	C0 192	DB 219	DC 220	DD 221	DE 222	E0 224	FB 251	FC 252	FD 253	FE 254
0	U.S.A.	#	$	@	[	\	]	^	`	{	¦	}	~	#	$	@	[	\	]	^	`	{	¦	}	~
1	France	#	$	à	°	ç	§	^	`	é	ù	è	¨	#	$	à	°	ç	§	^	`	é	ù	è	¨
2	Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	U.K.	£	$	@	[	\	]	^	`	{	¦	}	~	£	$	@	[	\	]	^	`	{	¦	}	~
4	Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì	#	$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain I	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	`	{	¦	}	~	#	$	@	[	¥	]	^	`	{	¦	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
12	Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
13	Korea	#	$	@	[	₩	]	^	`	{	¦	}	~	#	$	@	[	₩	]	^	`	{	¦	}	~
64	Legal	#	$	§	°	´	¨	¶	`	©	®	†	™	#	$	§	°	´	¨	¶	`	©	®	†	™

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1. PRINTER SETUP

1.1 Equipment Check

After unpacking the printer, make sure the items below are included:

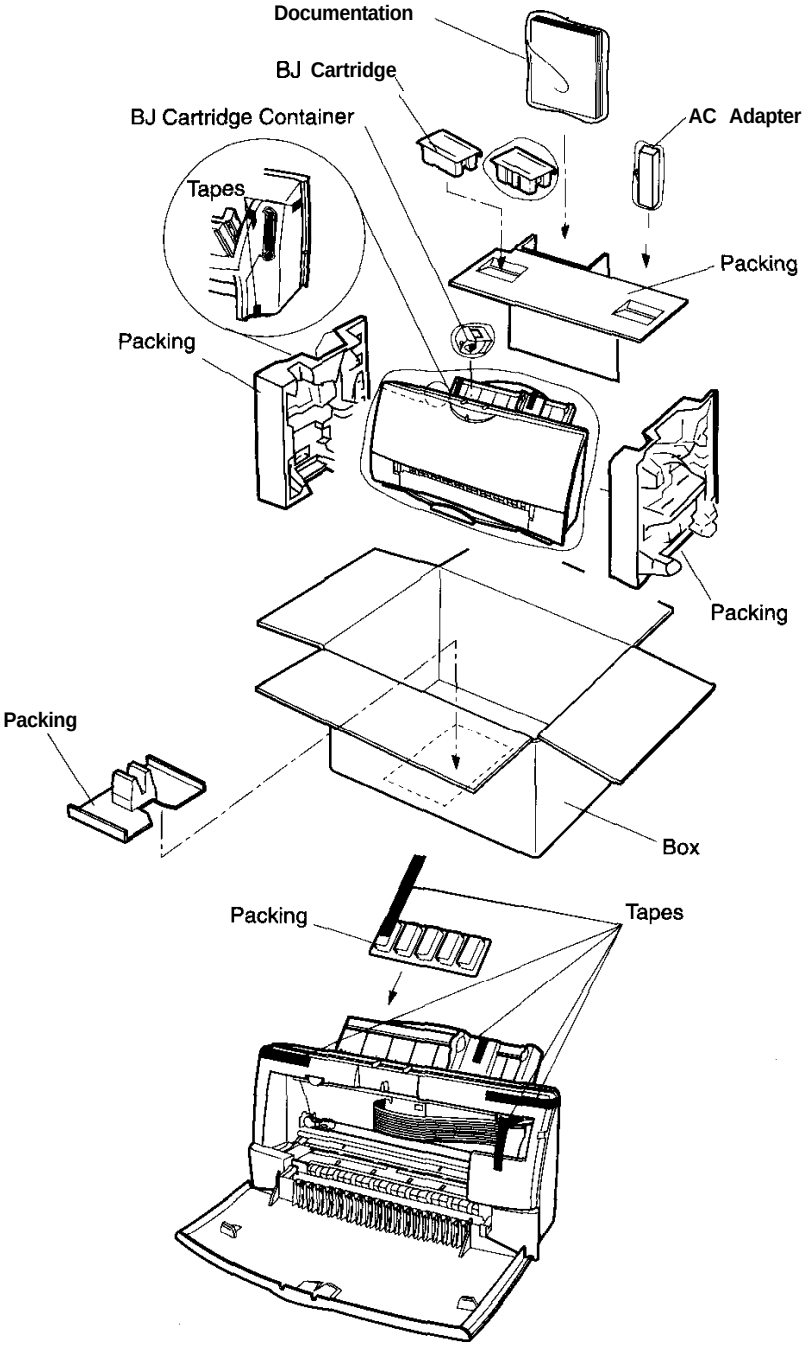


Figure 3-1 Packaging

1.2 Printer Dimensions

The printer's dimensions are shown below. Allow enough space for the printer to be used with ease.

For banner printing leave a space about the size of an M-size paper in front of the printer. Also allow enough space at the back of the printer to set the banner paper.

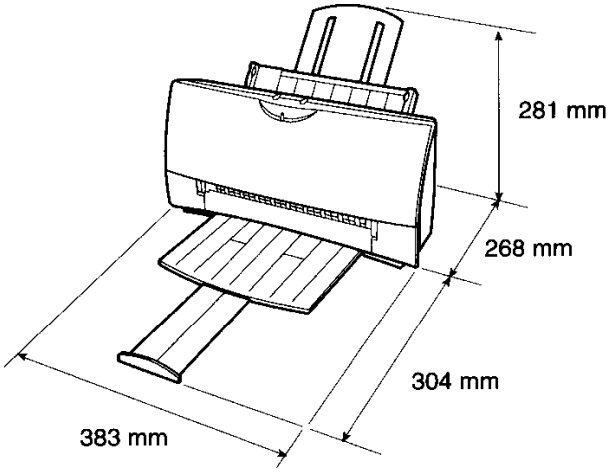


Figure 3-2 Printer Dimension

NOTE

Do not place the printer in excessive heat or humidity.

Operate the printer under the following conditions:

Ambient temperature: 5°C to 35°C

Relative humidity: 10% to 90% (no condensation)

Do not place the printer in direct sunlight.

Do not place the printer near a device containing a magnet or that generates a magnetic field.

Place the printer on a level and stable surface.

• Do not place the printer in areas subject to vibration.

Keep the printer clean.

When moving the printer, hold both ends.

1.3 Setup Procedure

set up the printer as follows.

1.3.1 Connecting the interface cable

1) Make sure both the printer and the computer are off.
2) Connect one end of the parallel interface cable to the parallel interface connector on the back of the printer.
   After connecting the cable, fasten the locking arm to secure it.
3) Connect the other end of the interface cable to the parallel interface connector on the computer.

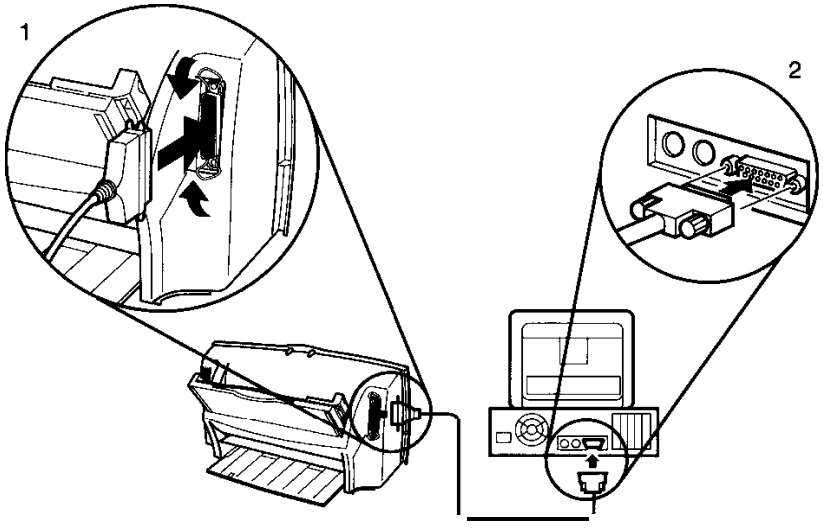


Figure 3-3 Connecting the Interface Cable

1.3.2 Connecting the AC adapter

Connect the DC power cord's plug to the printer's DC jack and plug in the AC adapter into a power outlet.

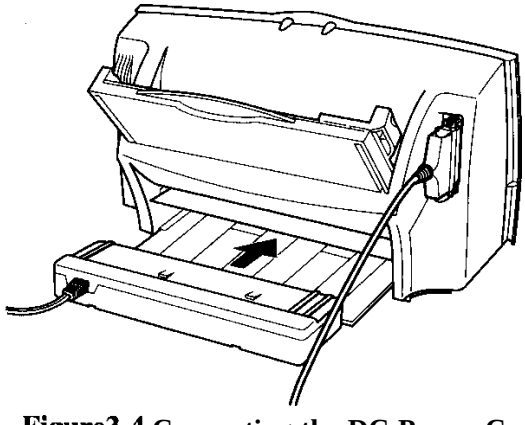


Figure3-4 Connecting the DC Power Cord

Do not press the *POWER* **button** while connecting the DC power cord. If the DC power cord is connected while the *POWER* button is pressed, the EEPROM reset mode in service functions are executed.

1.3.3 Turning on the printer

Before turning on the printer, first turn on the computer and any other peripheral equipment. Make sure the DC power cord has been connected properly, then press the ***POWER*** **button to turn on the printer. When turned on, the printer executes** initializing operations. Finally, the carriage stops at the cartridge replacement position and the POWER **indicator** blinks to indicate that the printer is on standby.

1.3.4 Installing the cartridge

Two types of cartridges can be installed in the printer: a color and black BJ cartridge.

1) Removing the BJ cartridge protectors

Take out the BJ cartridge from the package, then remove the cap and tape on the nozzles as shown in the figure.

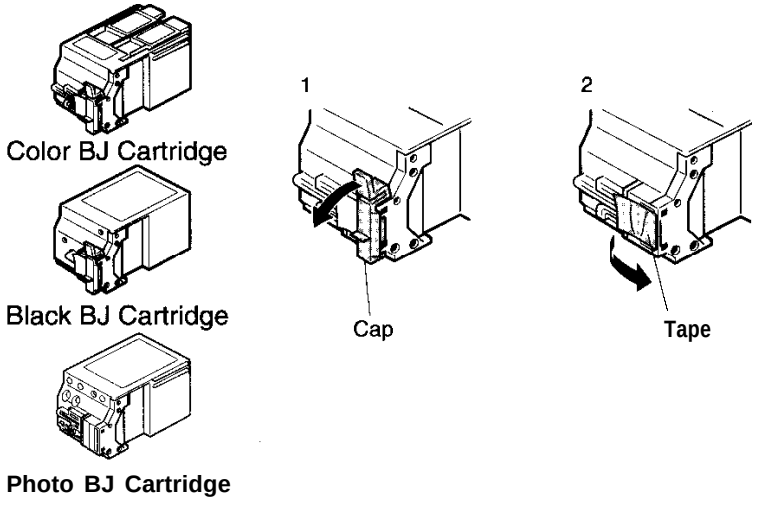


Figure 3-5 Removing the BJ Cartridge Protectors

CAUTION

Do not reuse the cap and tape, as doing so can clog the nozzles or mix the ink colors.
Do not touch the nozzles when removing the tape. Scratching the head face and ink contamination may result in the poor printing.
Do not shake the BJ cartridge after removing the cap and tape, as ink may leak from the cartridge.

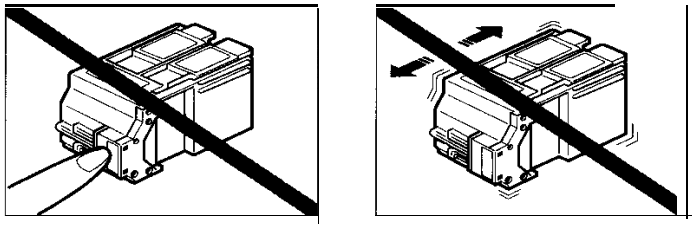


Figure 3-6 BJ Cartridge Handling Precautions

2) Installing the cartridge

Open the printer's front-cover and flip up the cartridge lock lever. Insert the cartridge into the carriage and push down the cartridge lock lever to lock the cartridge in place. When pressing the ***CARTRIDGE*** button, the beeper sounds once and the carriage moves to the capping position.

NOTE If the cartridge is not properly installed while holding down the *CARTRIDGE* button, the beeper will sound twice and the carriage will not return to the capping position. After installing the cartridge, be sure to close the front cover securely. If it is not closed properly, paper feed and printing problems may occur.

When installing the scanner cartridge, all the LEDs are lit at 75% power output at the home position for max. 100 sec., and preheated to stabilize the LED output. The computer will display a message saying 'Warming up scanner cartridge. Please wait." will appear. After the message appears, all the LEDs are lit at 50% power output for max. 600 sec. to retain the temperature.

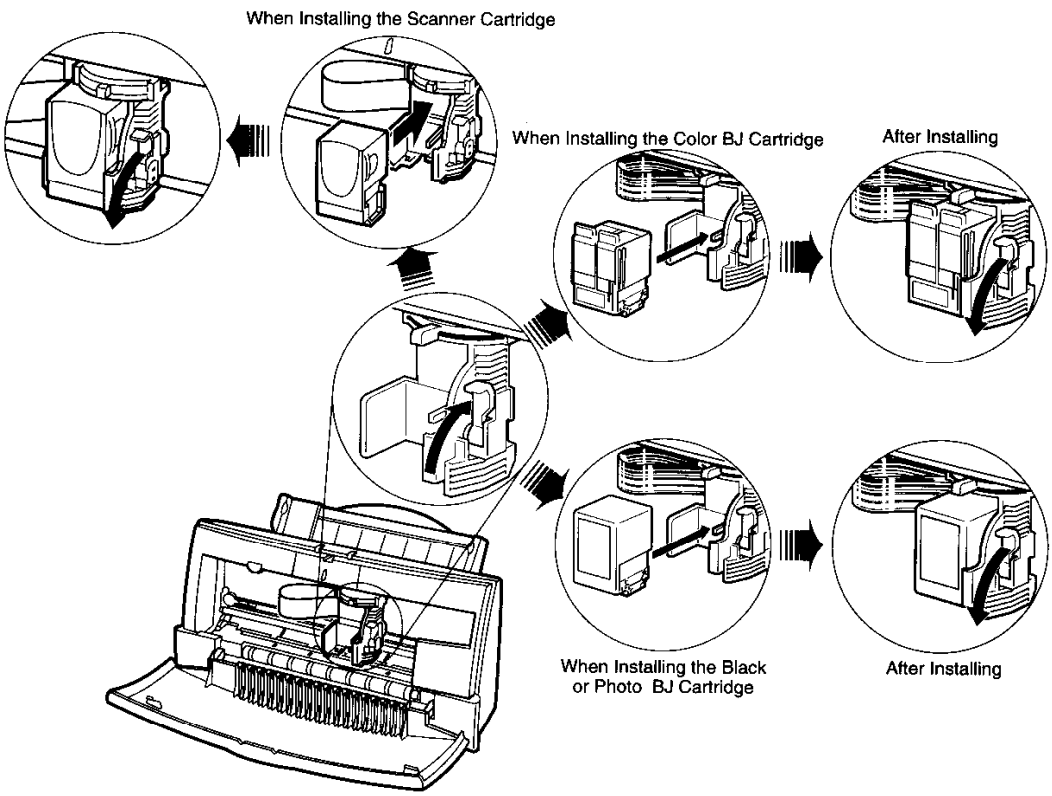

When Installing the Scanner Cartridge
When Installing the Color BJ Cartridge
After Installing
When Installing the Black or Photo BJ Cartridge
After Installing

Figure 3-7 Cartridge Installation

3) Replacing the cartridge

Open the printer's front cover and press the *CARTRIDGE* button the beeper sounds once and the carriage moves to the replacement position. Then flip up the cartridge lock lever and remove the cartridge. Install another cartridge by following 'Installing the cartridge" above. Always store an unused BJ cartridge in the BJ cartridge container. The BJ cartridge may be stored alternately in the BJ cartridge container.

If the printer has been operating for a prolonged period. the BJ cartridge's aluminum plate will get hot. When the aluminum plate gets hot, holding down the *CARTRIDGE* button will sound the beeper four times and the carriage will not move to the cartridge replacement position. In such cases, wait a few minutes before replacing the BJ cartridge. Do not move the carriage by hand.

1.3.5 Replacing the ink cartridge

When a color BJ cartridge is used, the ink cartridges can be replaced as follows:

1) When to replace the ink cartridge

Replace the ink cartridge in any of the following cases: The ink has run out, the ink cartridge has been out of its package for over six months, or the print quality does not improve even after the cartridge is cleaned five times. The color ink cartridge contains three colors. If one ink color runs out, the entire color ink cartridge must be replaced.

If an ink cartridge has been replaced but the print quality does not improve even after cleaning, replace the color BJ cartridge with a new one.

2) **Removing an ink cartridge**

Move the carriage to the cartridge replacement position as described in 1.3.4 3) **Replacing the cartridge** *(page 3-6)*. Then take out the ink cartridge to be replaced as shown in the figure below.

CAUTION

Ink adheres to and around the ink cartridge's ink inlet, so handle the cartridge with care.

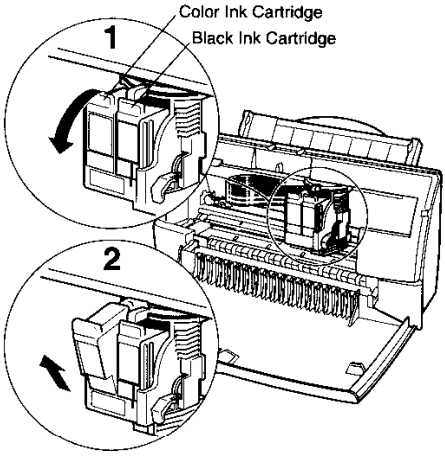


Figure 3-8 Removing the Ink Cartridge

3) **Installing an ink cartridge**

Take out the new ink cartridge from its package and remove the cap as shown in the figure. Install the ink cartridge by following the removal procedure in reverse.

After installing the ink cartridge, press the ***CARTRIDGE*** **button** the beeper sounds once and the carriage returns to the capping position.

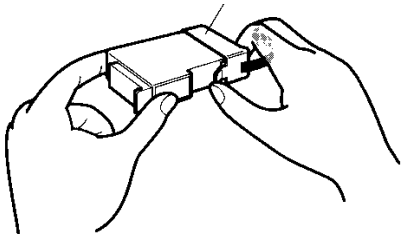


Figure 3-9 Removing the Ink Cartridge Cap

1.3.6 BJ cartridge container

A BJ cartridge container for storing the BJ cartridge is packed with the printer. Always store an unused BJ cartridge in the BJ cartridge container. The box can store one BJ cartridge only, but several containers can be joined together.

NOTE The BJ cartridge container can be attached to the printer.When storing a color BJ cartridge make sure that the black and color ink cartridges are installed.

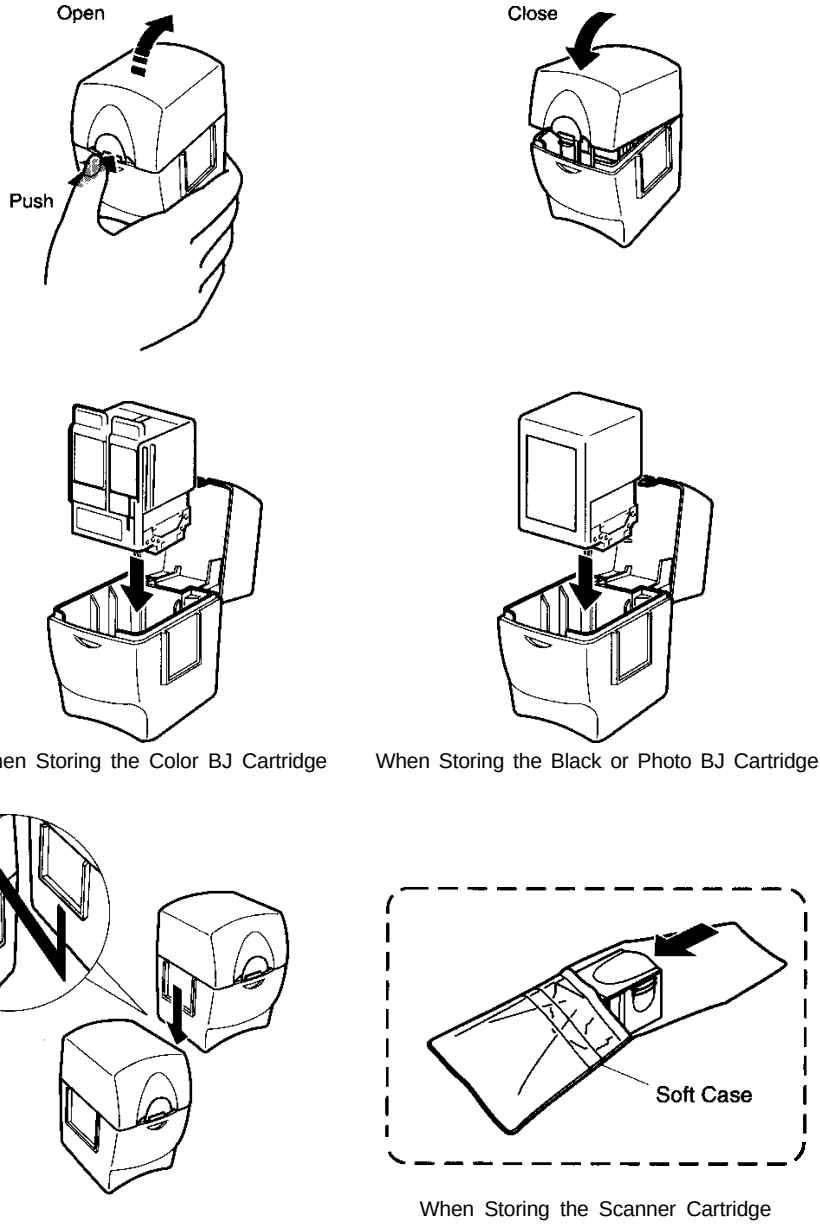


Figure 3-10 BJ Cartridge Container

1.4 Turning the Printer On/Off

1.4.1 Turning the printer on

With the printer connected to a power source, press the POWER button to turn on the printer. When the printer turns on, the beeper sounds once and initializing operations are executed. If a cartridge has not been installed, the carriage will move to the cartridge replacement position and the POWER indicator blinks to indicate that a cartridge must be Installed. If a BJ cartridge has already been installed, the POWER indicator will light to indicate that the printer is ready. When the printer is turned on after more than 72 hours have passed since the last cleaning operation, the printer automatically carries out a cleaning operation before printing or after the printer is turned on.

(When a color BJ cartridge is installed, the first cleaning is executed after 24 hours.)

The POWER indicator blinks while the cartridge is being cleaned.

1.4.2 Turning the printer off

To turn off the printer, press the ***POWER*** **button. When the** printer is turned off, it executes a power-off operation to cap the BJ cartridge. When the scanner cartridge is installed, the carriage will move to the carriage replacement position, i.e. the same position as when there is no cartridge installed, before the power is turned off. When the power-off operation is complete, the ***POWER*** **indicator turns off.** Make sure the ***POWER*** **indicator is off,** before disconnecting the AC power cord.

Never turn off the printer by disconnecting the AC power cord without first pressing the ***POWER*** **button.** Otherwise, the printer turns off before it can cap the BJ cartridge. If the BJ cartridge is not capped, the ink may leak or dry out in the nozzles.

When the POWER **button is** pressed to turn off the printer, the power-off operation to cap the BJ cartridge is executed even if errors have occurred.

Any error occurring after the power-off operation starts is ignored. Also, if the ***POWER*** **button is** pressed while the cartridge is being cleaned, the ***POWER*** **indicator continues** blinking until the cleaning is completed. After cleaning is completed, the BJ cartridge is capped and the printer turns off.

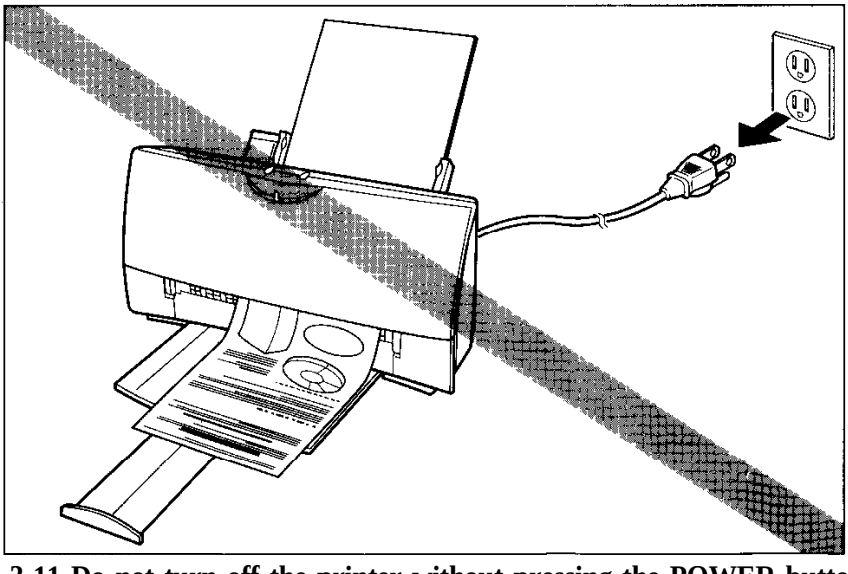


Figure 3-11 Do not turn off the printer without pressing the POWER button first

1.5 Paper Settings

For optimum printing, the printer has various paper settings to suit various types of paper. Set the paper selection lever before loading the paper.

TABLE 3-1 QUICK REFERENCE FOR SETTING

Media	Thickness Lever		Paper Feed		Flap
	Black	Color/Photo	Method	Limit	Position
Plain paper	Left	Center	Sheet feeder	10 mm	Flat
High resolution paper	Center		Sheet feeder	10 mm	Upright
Envelopes	Right		Sheet feeder	10 envelopes	Flat
Transparencies	Center		Sheet feeder	50 sheets	Upright
Back print film	Center		Sheet feeder	10 sheets	Upright
Glossy photo paper	Center		Sheet feeder	1 sheet	Upright
Banner paper	Right		Sheet feeder	1 sheet	Upright
Fabric sheet	Right		Sheet feeder	1 sheet	Upright
High gloss film	Center		Manual feed slot	1 sheet*	Upright

* 1 Slide one sheet all the way into the manual feeding slot.

1.6 Banner Print

When printing on banner paper, lower the paper support and set the paper delivery flap to the upright position. To avoid misfeeding, put a light crease between the first and second page and set the first page in the sheet feeder. Place the rest of the banner paper behind the printer. Do not use the manual feeding slot to avoid skewing.

Each top margin for banner printing is set at Omm. However, to avoid printing on the platen, printing will start 3mm from the initia top margin. Set an extra sheet at the end in case the bottom edge is not printed on the last page.

Banner printing uses a large amount of ink. To avoid ink shortage, use of a new ink cartridge before banner printing is recommended.

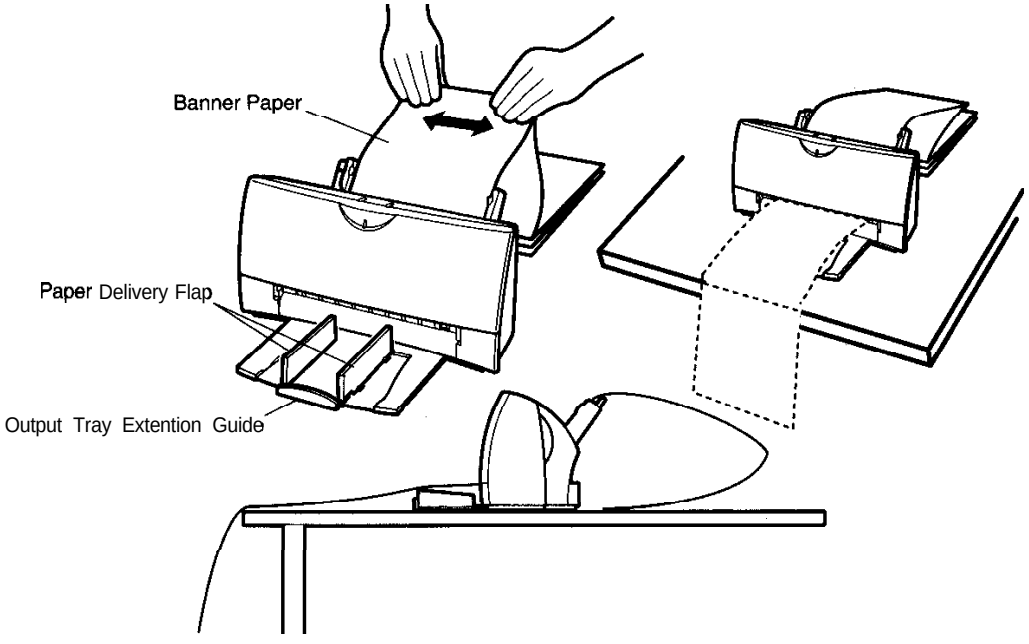


Figure 3-12 Banner Print

1.7 Name of the Parts and Their Functions

The different parts of the printer and their functions are shown below.

Paper Support
Supports the stack of paper loaded in the cut sheet feeder.

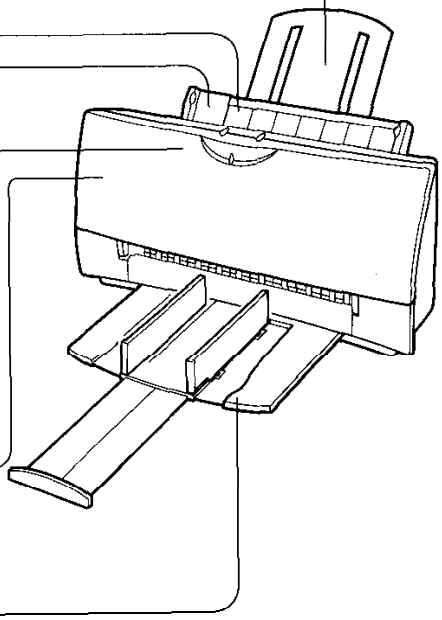
Cut Sheet Feeder
Holds a stack of approximately 100 cut sheets (64g/cm²) for automatic feeding.

Paper Guide
Aligns the cut sheets in the cut sheet feeder according to the paper size. A maximum paper width of 241 mm (9.64 in.) can be set. Autofeeds banner paper and scanning document.

Control Panel
See the next page.

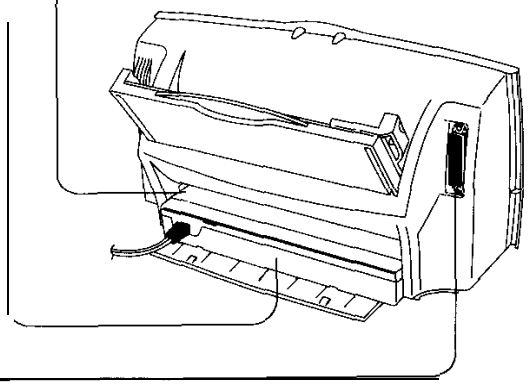
Front Cover
Open to install or remove the cartridge. set the paper thickness lever, or remove the jams paper.

Paper Output Tray
Pulls out to receive the printed sheets.



Manual Feeding Slot
Use for feeding media manually.

AC **Adapter**
Installed on the rear of the printer, the AC adapter supplies power from the power outlet to the printer. Depending on the location of purchase, the power cable is permanently attached to the AC adapter where as in some areas the power cable is detachable.

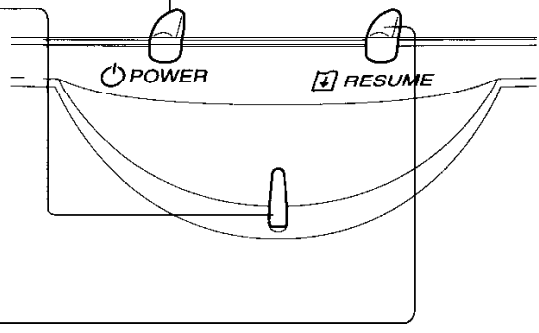


Parallel Interface Connector
Connects the printer to the parallel port on the computer.

Figure 3-13 Name of the Parts and Their Functions

***POWER* Button**
Turns the printer on or off.

POWER/ERROR **Indicator**
This signal indicator functions as both the power indicator and error indicator. This indicator lights green to indicate that power is on (normal state). The indicator lights orange to indicate an error, when the printer runs out of paper, for example.



RESUME **Button**
This key has the following functions:
- To recover an error, press once and release.
- To feed a sheet of paper into the printer, press once and release.
- To eject a sheet of paper already loaded in the printer.
- To start cleaning the print head, press and hold down for over two seconds.

***CARTRIDGE* Button**
Moves the carriage to the BJ cartridge or ink cartridge replacement position.

Paper thickness lever
Adjusts the gap betwween the print head and the paper. Set this lever according to the type of print media that you are **using.**

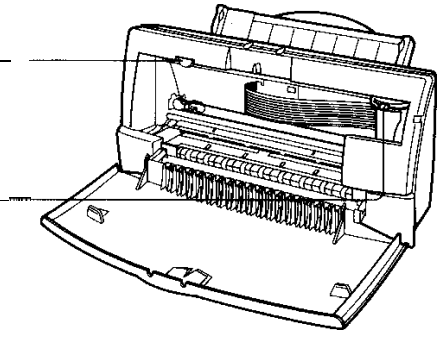


Figure 3-14 Name of the Parts and Their Functions

Paper thickness lever

Adjusts the gap between the print head and paper according to the thickness of the paper. There are three settings: left for printing with the black BJ cartridge on plain paper: center for printing with the color/photo BJ cartridge on plain paper or high resolution paper, transparencies, back print film, glossy paper or high glossy film and scanner cartridge: and right for thick paper, envelopes and banner paper.

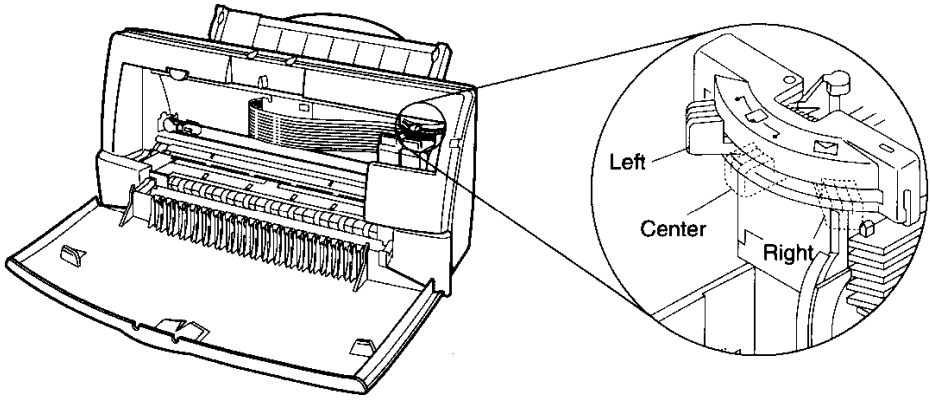


Figure 3-15 Paper Thickness Lever

2. TRANSPORTING THE PRINTER

When carrying or transporting the printer. keep the BJ cartridge installed in the printer or stored in the BJ cartridge container.
This prevents the ink from leaking and drying out in the nozzles

2.1 Carrying the Printer

Follow the procedure below when carrying the printer.

1) Press the POWER button to turn off the printer. When the power turns off, the *POWER* indicator turns off.
2) Disconnect the interface cable.
3) Disconnect the AC power cord from the AC outlet.
4) Unplug the AC adapter from the printer.
5) Check that the AI cartridge is at the capping position (the right end of the printer). If the cartridge is not at the capping position, move the carriage belt by hand until the cartridge reaches the capping position.

CAUTION

Never turn off the printer by disconnecting the AC power cord without first pressing the *POWER* button. Otherwise, the printers turned off before it can cap the BJ cartridge. If the BJ cartridge is not capped, the ink may leak or dry out in the nozzles.

2.2 Transporting the Printer

Follow the procedure below, when transporting the printer.

1) Disconnect the interface cable and AC power cord as described above in 2.1. Carrying *the printer.*
2) Check that the BJ cartridge is at the capping position (the right end of the printer). If necessary, move it to the capping position by hand. Fasten the carriage to the right end of the printer with tape.
3) Repack the printer in its original box and packing materials.

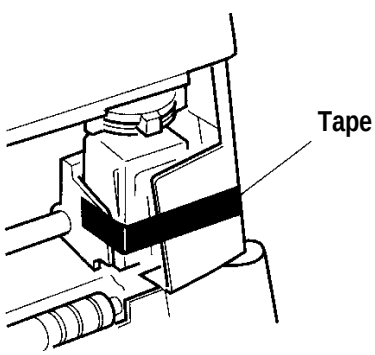


Figure 3-16 Fastening the Carriage

NOTE

If the original packing materials are not available, use a sufficient amount of shock-absorbent material.

3. PRINTER SERVICING FUNCTIONS

3.1 Error indications

The indicators in combination with the beeper indicate the nature of errors.

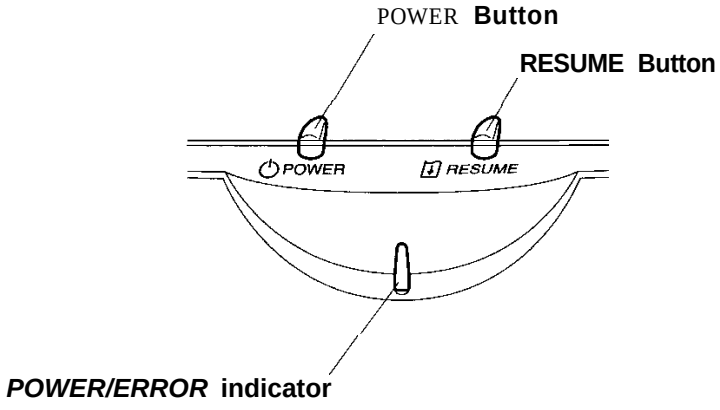


Figure 3-17 Control Panel

TABLE 3-2 ERROR INDICATIONS

State	POWER/ERROR	Beeper
[User-correctable errors]		
Paper pick-up error	orange	Once
Paper jam	Orange	Twice
Cartridge mode mismatch	orange	5 times
[User-uncorrectable errors]		
ROM error	Green ↔ Orange	Once
RAM error	Green ↔ Orange	Twice
Cartridge displaced error	Green ↔ Orange	3 times
Home position error	Green ↔ Orange	4 times
Waste ink full error	Green ↔ Orange	5 times
Temperature sensor error	Green ↔ Orange	6 times
Print position correction error	Green ↔ Orange	7 times
Head temperature error	Green ↔ Orange	8 times
Head temperature sensor error	Green ↔ Orange	9 times
Cleaning error	Green ↔ Orange	LO times
Scanner cartridge displaced error	Green ↔ Orange	1 1 times

The errors listed in Table 3-2 are described below.

User-correctable errors (Correctable by removing the paper and pressing the RESUME button).

1) **Paper pick-up error**
   Occurs when the paper cannot be fed properly.
2) **Paper jam**
   Occurs when the printed paper cannot be ejected.
3) **Cartridge mode mismatch**
   Occurs when the scanning operation is performed with a BJ cartridge installed. Occurs also when printing with a scanner cartridge installed (including Self Test printing).

User-uncorrectable errors. (Press the ***POWER*** button to turn off the power.)

4) **ROM error**
   Occurs when the ROM check during the initializing operation fails.
5) **RAM error**
   Occurs when the RAM check during the initializing operation fails.
6) **Cartridge displaced error**
   Occurs when the printer does not detect the cartridge other than during cartridge replacement.
7) Home **Position Error**
   Displayed when the home position can not be detected.
6) **Waste ink full error**
   Occurs when the "total waste ink amount" recorded by the EEPROM exceeds the prescribed limit.
9) **Temperature sensor error**
   Occurs when the temperature sensor's (TH1) reading on the control board is irregular.
10) Print **position correction error**
   Occurs when the print position correction cannot be detected.
11) **Head temperature error**
   Occurs when the temperature of the diode sensor in the BJ cartridge head exceeds the prescribed level.
12) **Head temperature sensor error**
   Occurs when the diode sensor in the BJ cartridge head is assessed as irregular. (The head temperature error always occurs before this error occurs.)
13) **Cleaning error**
   Occurs when the cleaning operation detection at the capping position is irregular.
14) Scanner cartridge **displaced error**
   Occurs when the scanner cartridge is recognized but the scanner ID is incorrect. Occurs when the calibration data sent from the computer is incorrect.

3.2 Function Settings

Use the windows driver or BJ setup utility program for MS-DOS to set the function settings.

The five default setting modes can be set with the POWER button after the printer is turned on.

3.2.1 Setting the default setting mode

The default setting mode can be set as follows:

When turning on the printer, hold down the ***POWER*** button until the beeper sounds the specified number of times. In this way, the following default setting modes can be set.

TABLE 3-3 DEFAULT SETTING MODES

Mode	Beeper	Remarks
USA/LQ	6 times	Factory default setting for USA model
USA/BJ	7 times	
Europe, Asia/LQ	8 times	Factory default setting for the models excluding USA model
Europe /BJ	9 times	
Asia, UK/BJ	10 times	

Function settings of each default setting mode.

TABLE 3-4 DEFAULT SETTING MODE FUNCTION SETTINGS

	USA /LQ	USA /BJ	Europe, Asia/LQ	Europe /BJ	Asia, UK /BJ
Control mode	LQ	BJ	LQ	BJ	BJ
Paper selection	LTR	LTR	A4	A4	A4
Print mode	HQ	HQ	HQ	HQ	HQ
Smoothing setting	Off	Off	Off	Off	Off
Auto power on	Off	Off	Off	Off	Off
Auto power off	Off	Off	Off	Off	Off
Font selection	Roman	Courier	Roman	Courier	Courier
Code page selection	437	437	437	850	437
Page length setting	22”	11”	22”	12”	12”
Character set setting	Graphics	set1	Graphics	Set2	set2
Text scale function	Off	Off	Off	Off	Off
Download buffer setting	Off	Off	Off	Off	Off
Receive buffer size	22KB	22KB	22KB	22KB	22KB
Automatic line feed	CR	CR	CR	CR	CR
Automatic carriage return (BJ only)		LF	...	LF	LF
AGM setting (BJ only)	...	Off		Off	Off
International character setting (LQ only)	USA		USA		

3.2.2 BJ setup utility program

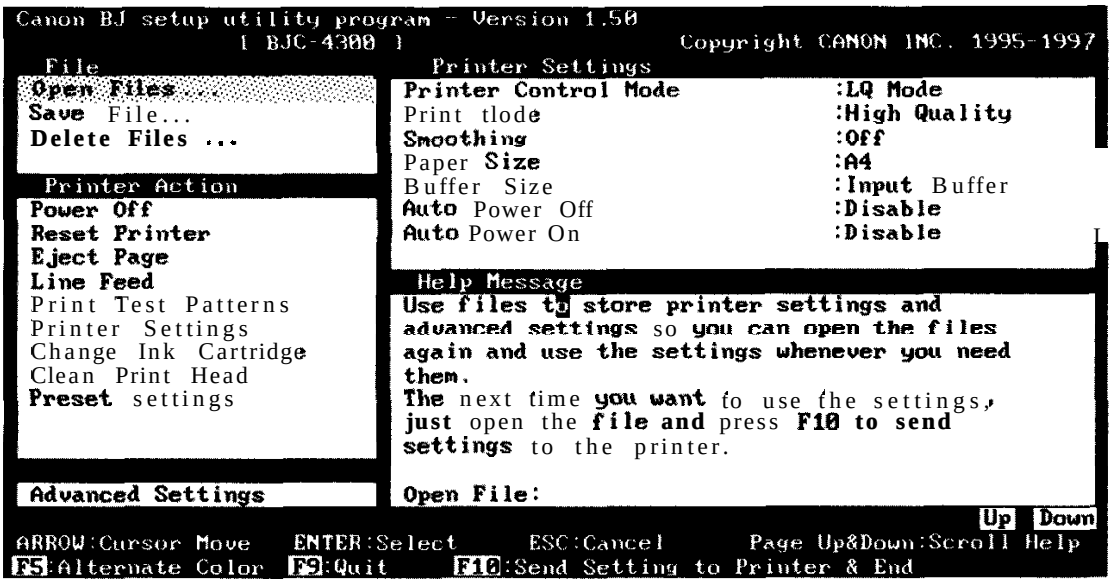

Canon BJ setup utility program - Version 1.50
[BJC-4300]
Copyright CANON INC. 1995-1997
File
Open Files ...
Save File...
Delete Files ...
Printer Action
Power Off
Reset Printer
Eject Page
Line Feed
Print Test Patterns
Printer Settings
Change Ink Cartridge
Clean Print Head
Preset settings
Advanced Settings
Printer Settings
Printer Control Mode :LQ Mode
Print tlode :High Quality
Smoothing :Off
Paper Size :A4
Buffer Size :Input Buffer
Auto Power Off :Disable
Auto Power On :Disable
Help Message
Use files tg store printer settings and advanced settings so you can open the files again and use the settings whenever you need them.
The next time you want to use the settings, just open the file and press F10 to send settings to the printer.
Open File:
Up Down
ARROW:Cursor Move ENTER:Select ESC:Cancel Page Up&Down:Scroll Help
F5:Alternate Color F9:Quit F10:Send Setting to Printer & End

Figure 3-18 BJ Setup Utility Program (Sample)

Function settings which can be set with the BJ setup utility program.
Here is a short summary of the BJ setup utility program features. For further details, type BJ on the command line to start the utility program and scroll through the on-line help.

Advanced Settings
These settings include all the settings for either BJ mode or LQ mode. The advanced settings are all on the second screen of the BJ setup utility program.

AGM
Turns alternate graphics mode (AGM) on and off in BJ mode. Turn on AGM for IBM Proprinter X24E emulation.

Auto Carriage Return
Sets how the printer performs a carriage return.

Auto Line Feed
Sets how the printer does a line feed in BJ mod? or LQ mode.

Auto Power Off
Sets the printer to turn itself-off automatically when it has not received data for a certain period of time.

Auto Power On
Sets the printer to turn itself on automatically after it receives data.

Buffer Size
Allows you to change the allocation of available space in the buffer.

Change Ink Cartridge
Moves the cartridge holder to the center of the platen so you can change the cartridge.

Character Set
Code pages and character sets may vary according to the make of the computer and printer. For the BJ mode. Character Set 1 or set 2 can be selected. In LQ mode, epson italic or graphics set can be selected.

Clean Print Head
Cleans the BJ cartridge print head. If white streaks or other flaws appear on the printed page, clean the print head.

Code Page
Allows you to select a code page in either BJ mode or LQ mode. Pages are tables that show how characters, symbols, and numbers are coded.

Delete File
Deletes a file and settings. Delete files that are no longer needed

Eject Page
Ejects paper or other media currently loaded in the printer.

Font Typeface
Allows the selection of one of 5 typefaces: Roman, Gothic, Courier, Prestige, Script in either BJ mode or LQ mode. This setting is ignored when the software application specifies a font.

International C.S.
Allows you to select a character set, characters and symbols specific to each country in LQ mode.

Line Feed
Sends a line feed (LF) instruction to the printer and the printer feeds the loaded sheet one line.

Open File
Opens a saved file and retrieves the printer and advanced settings that it holds. After opening a file, press F10 to send the settings to the printer and close the BJ setup utility program.

Page Length
Sets the page length for BJ or LQ mode

Paper Size
Sets the paper size. Selections include A4, Letter, #10 Envelope (3.4 mm), DL Envelope (6.2 mm).

Power Off
Turns off power to the printer.

Preset Settings
You can select one set of defaults from a list. Each set is named by country and control mode. For example, you can choose USA (LQ) or USA (BJ).

Print **Mode**
Sets the print mode for HQ (high quality), HS (high speed) and Fine.

Print Test Patterns
Prints a test pattern so you can check printer operation with the new settings you have just made. Before you execute this command, be sure the printer can load A4 or Letter-size paper. A Demonstration of printer features, Test Print A (repeating ripple pattern), and a Nozzle Pattern Print can be printed.

Printer Control Mode
Sets the emulation mode for the printer: BJ mode and LQ mode, Automatic mode.

Printer Port
The printer is attached to parallel port LPT1 by default. To connect your printer to a different port, make an appropriate selection here: LPT1, LPT2 and LPT3.

Printer Settings
Prints a list of all the current printer settings. Be sure to use Letter-size or A4 paper to print this list.

Reset Printer
Takes the new printer and advanced settings you have just made and stores them as the new default settings for the printer.

Save **File**
Saves a file with the settings made in the menus

Smoothing
Smoothing removes the ragged edges that appear on characters and curved lines. These so called "jaggies" are caused by a stair-stepping effect caused by creating characters and lines with individual dots when printed.

Text Scale Mode
Provides compatibility with software that assumes 66 lines will fit on each page for either BJ or LQ mode.

3.3 Cleaning the BJ Cartridge

Turn on the printer. Hold down the RESUME button until the beeper sounds twice. The cleaning starts when **the POWER indicator** blinks. When the cleaning is completed, the blinking stops. The cleaning time is approximately 22 seconds.

After the cleaning, execute a test printout of thr nozzle check pattern to check the print quality. (With the printer turned on, hold down the ***POWER*** **button** until the beeper sounds four times, then release the button to conduct the off-line test. The test stops when the RESUME button is pressed on.

The printer cleans the E&J cartridge automatically at the following times:

1)When the printer is turned on for the first time after the power cord has been connected.

2) After the BJ cartridge is replaced.

3) After an ink cartridge is replaced.

4) After the printer has been on for 72 hours following the last cartridge cleaning with a black BJ cartridge installed. When the color BJ cartridge or its ink cartridge is installed, only the first cleaning is carried out automatically after 24 hours (after that, cleaning is carried out at an interval of 72 hours).

5) After printing a prescribed number of dots.

3.4 Self-Test Printout

This printer has built-in self-test functions which can be executed without any connection to a computer. The off-line, self-test operations are described below. After turning on the printer, hold down the POWER button until the beeper sounds the specified number of times, then release the button. The self-test printout stops when the RESUME button is pressed or when the printer is turned off.

TABLE 3-5 SELF-TEST PRINT MODES

Printout Mode	Beeper	Pages printed
Demonstration print	Once	Continuous printing
Printer status information print	Twice	1 page
ASCII character print	3 times	continuous printing
Nozzle check pattern	4 times	1 page

NOTE

All self-test prints require Letter or A4-size paper. Using a smaller size paper for a self-test print will result in parts of the printout being printed directly on the platen.

Self-test prints are printed in accordance with the current printing settings (font, printing mode, etc.).

3.4.1 Demonstration print

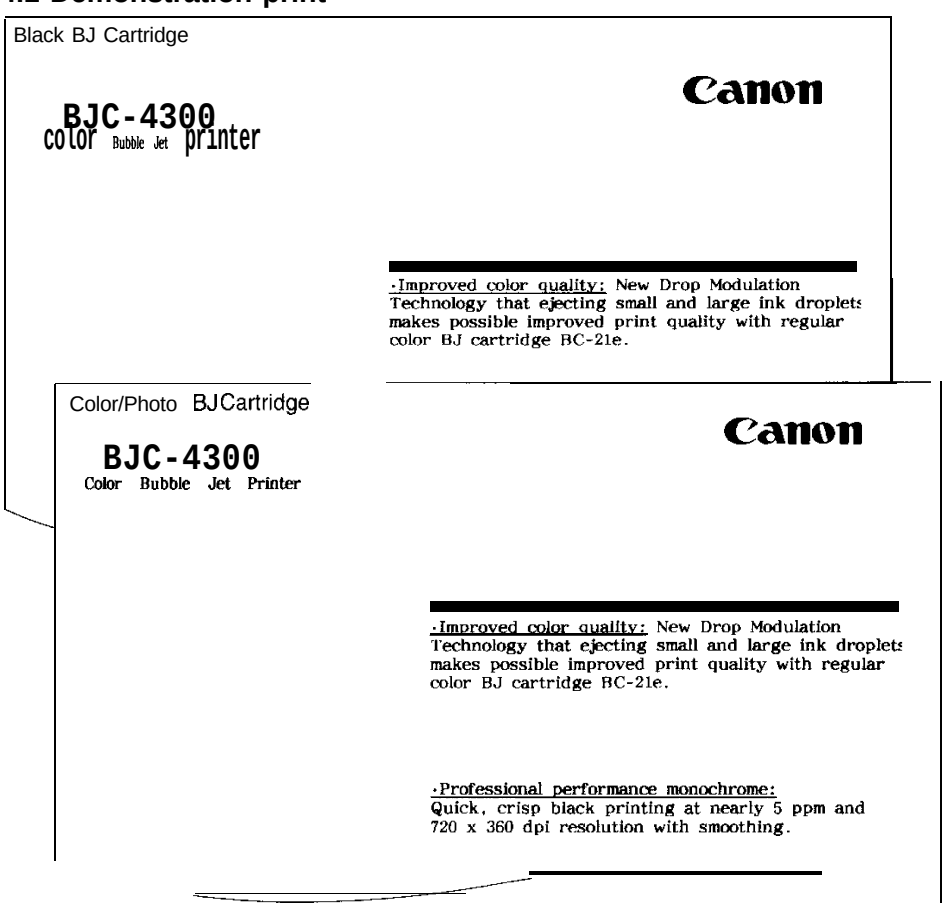

Black BJ Cartridge
BJC-4300
color Bubble Jet printer
Canon
·Improved color quality: New Drop Modulation Technology that ejecting small and large ink droplets makes possible improved print quality with regular color BJ cartridge BC-21e.
Color/Photo BJCartridge
BJC-4300
Color Bubble Jet Printer
Canon
·Improved color quality: New Drop Modulation Technology that ejecting small and large ink droplets makes possible improved print quality with regular color BJ cartridge BC-21e.
·Professional performance monochrome:
Quick, crisp black printing at nearly 5 ppm and 720 x 360 dpi resolution with smoothing.

Figure 3-19 Demonstration Print (Sample)

3.4.2 Printer status information print

		>BJ<	>LQ<
1	Printer Control Mode	: Enable	Disable
2.	Paper Selection	: LTR	<---
3.	Print Mode	: High Quality	<---
4.	Smoothing (Black BJ Cartridge)	: Disable	<---
5.	Automatic Power on	: Disable	<---
6.	automatic Power off	: Disable	<---
7.	Font	: Courier	Roman
8.	Code Page	: 43:	437
9.	Page Length	: 11inch	22inch
10.	Character Set	: SET1	Graphics
11.	Text Scale	: Disable	Disable
12.	Download Buffer	: Disable	<---
13.	Receive Buffer Size	: 22KB	<---
14.	Automatic Line Feed	: CR-CR	CR=CR
15.	Automatic Carriage Return	: LF=LF	
16.	Alternate Graphics Mode	: Disable	
17.	International Character Set		USA
18.	Installed Cartridge Type	: Black BJ Cartridge	
19.	Printer Preset Status	: USA-BJ	<---

Figure 3-20 Printer Status Information Print (Sample)

3.4.3 ASCII character print (ripple pattern)

The printer control mode, control ROM version, and function settings in the header section are printed out as shown below. The same patterns are printed for the color BJ cartridge and black BJ cartridge

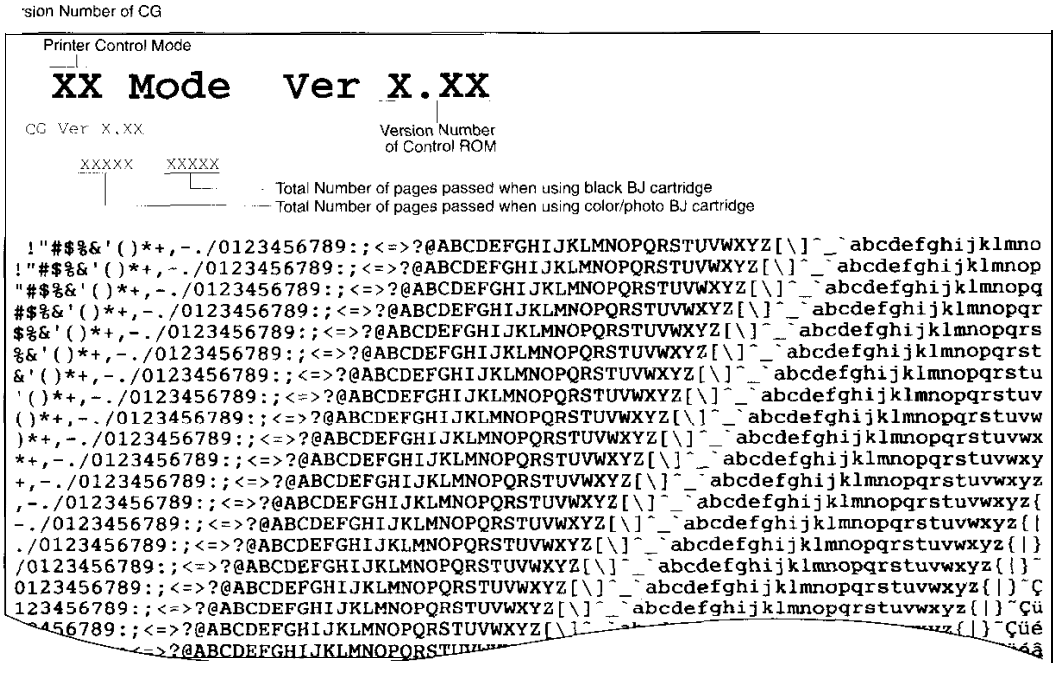


Figure 3-21 ASCII Character Printout (Sample)

3.4.4 Nozzle check pattern

Printout this pattern using all nozzles of the BJ cartridge. In the event that print defects appear, perform a cleaning operation of the head. If print quality does not improve even after the cartridge is cleaned five times, replace the BJ cartridge or the ink cartridge.

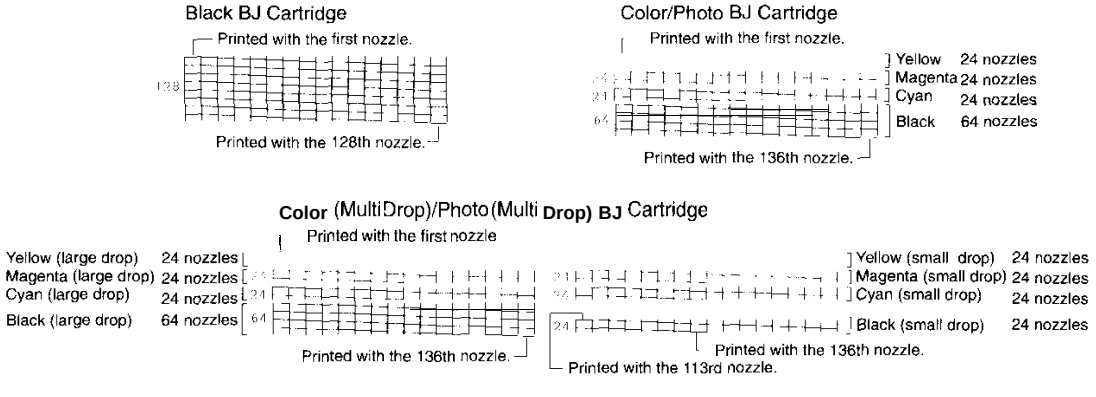

Black BJ Cartridge
Printed with the first nozzle.
128
Printed with the 128th nozzle.
Color/Photo BJ Cartridge
Printed with the first nozzle.
Yellow 24 nozzles
Magenta 24 nozzles
Cyan 24 nozzles
Black 64 nozzles
24
24
64
Printed with the 136th nozzle.
Color (MultiDrop)/Photo (Multi Drop) BJ Cartridge
Printed with the first nozzle
Yellow (large drop) 24 nozzles
Magenta (large drop) 24 nozzles
Cyan (large drop) 24 nozzles
Black (large drop) 64 nozzles
Yellow (small drop) 24 nozzles
Magenta (small drop) 24 nozzles
Cyan (small drop) 24 nozzles
Black (small drop) 24 nozzles
Printed with the 136th nozzle.
Printed with the 113rd nozzle.
Printed with the 136th nozzle.

Figure 3-22 Nozzle Check Pattern

3.5 Hexadecimal Dump Test Printout

This printer can execute a hexadecimal dump test printout. The hexadecimal dump test prints the data sent from the computer to the printer by hexadecimal data. Turn on the printer and hold down the POWER button until the beeper sounds five times. Then release the button to execute the hexadecimal dump test printout. The printout stops when the printer is turned off. The hexadecimal dump test printout cannot be terminated with the RESUME button.

TABLE 3-6 HEXADECIMAL DUMP TEST PRINT

Test mode	Beeper
Hexadecimal dump test	5 times

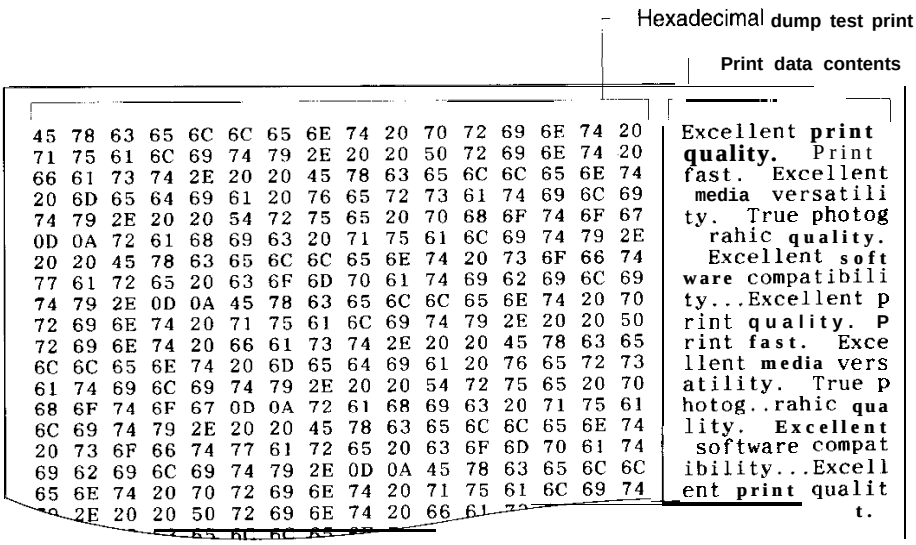


Figure 3-23 Hexadecimal Dump Test Printout (Sample)

3.6 EEPROM Reset

The EEPROM records various settings, the data on the total number of sheets printed and the total waste ink absorption amount for the color and black ink cartridges respectively. The total number of sheets printed and the total wastes ink absorption amount can serve as a reference for how much the printer has been used.
The EEPROM must be reset when the logic board or the waste ink absorber is replaced. See *Part 5:* 4.3 *Logic Board and Waste Ink Absorber Replacement Cautions (page 5-5),* for details.

3.6.1 EEPROM Reset

"Waste ink full' is detected with the total waste ink absorption amount recorded in the EEPROM. When the ink absorber is replaced, the data on the total waste ink absorption amount in the EEPROM must be reset. Furthermore, when the logic board is replaced, the new logic board's EEPROM must be reset and the waste ink absorber must be also replaced at the same time. To reset the EEPROM, follow the procedure below.

1. While holding down the *POWER* and RESUME button, insert the plug of AC power cord connected to the AC outlet into the printer, and release the button.

2. Press the *POWER* button, while holding down the *RESUME* and *CARTRIDGE* buttons. (After the indicator lights orange, the long and short beepers sound once.

3. Select the default setting by pressing the *CARTRIDGE* button for the specified number of times shown in the table below. (The beeper sounds each time the *CARTRIDGE* button is pressed.)

TABLE 3-7 DEFAULT SETTING WHEN RESETTING THE EEPROM

Beeper	Lights status	Default setting
Once	Green	Table2(USA/LQ): Factory default setting for USA/ Canada model
Twice	Orange	Table2 (USA/BJ)
3 times	Green	Table3 (Europe, Asia/LQ): Factory default setting for the models excluding USA/ Canada model
4 times	Orange	Table4 (Europe/BJ)
5 times	Green	Table5 (Asia, UK/BJ)

4. Finally, press the *RESUME* button. The EEPROM is cleared and the selected default setting is written into the EEPROM.

Be careful when performing the above operation as the EEPROM data cannot be recovered once it is reset.

3.6.2 Printing the EEPROM data

The following data recorded by the EEPROM can be printed out as described below:

1) Function setting:
   Execute the self-test printouts Printer status information print.
   See 3.4 *Se/f-Test Printout (page 3-21).*

2) Total number of sheets printed for the color and black ink cartridges respectively:
   Execute the self-test print's ASCII character printout.
   See 3.4 *Se/f-Test Print (page 3-21).*

3) Total waste ink absorption amount:
   Print out the total waste ink absorption amount as follows:
   1. Install a black BJ cartridge in the printer. (The total waste ink absorption amount cannot be printed out with the color BJ cartridge installed.)
   2. Press and hold down the *POWER, RESUME* button, connect the AC power cable to the AC outlet.
   3. Load a sheet of paper into the printer.
   4. While pressing the RESUME button, turn on the printer. After the buzzer sounds once, the total waste ink absorption amount will be printed out.

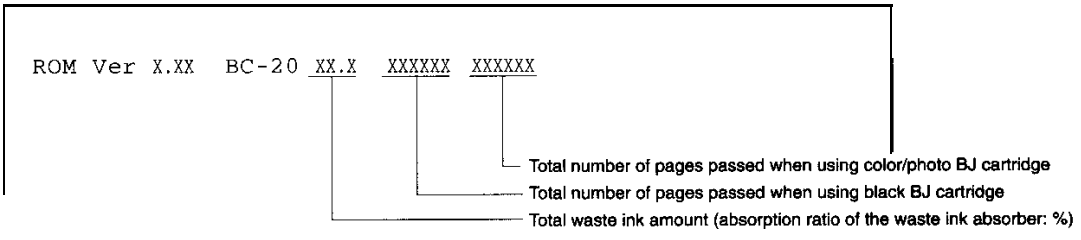

ROM Ver X.XX BC-20 XX.X XXXXXX XXXXXX
Total number of pages passed when using color/photo BJ cartridge
Total number of pages passed when using black BJ cartridge
Total waste ink amount (absorption ratio of the waste ink absorber: %)

Figure 3-24 Sample Printout of EEPROM Data

Resetting the EEPROM will permanently erase all data contained.

1.1 Printer Diagram

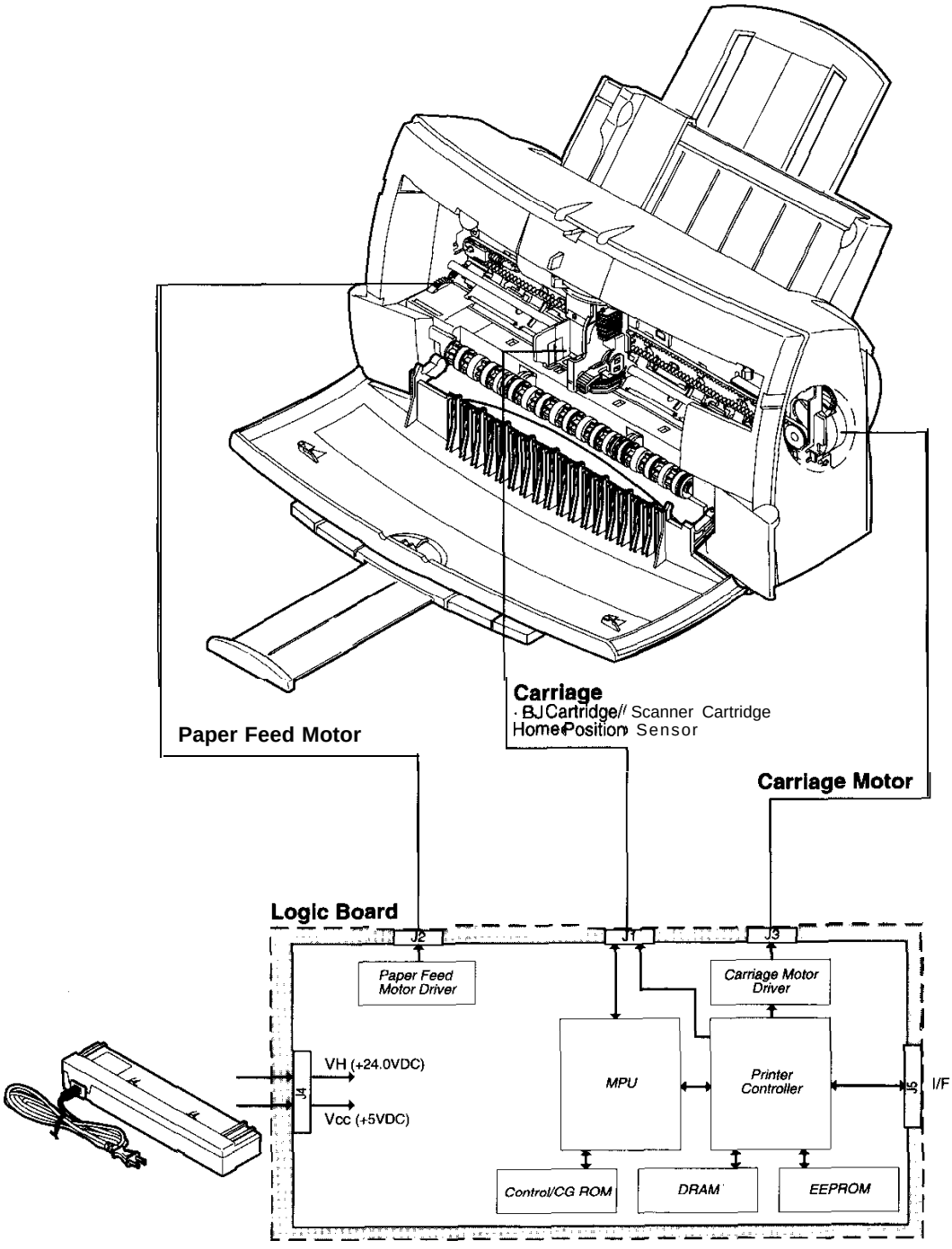


Figure 4-1 Printer Diagram

1.2 Initial Flowchart

The initial flowchart below shows the process from when the printer is turned on to when it goes online.

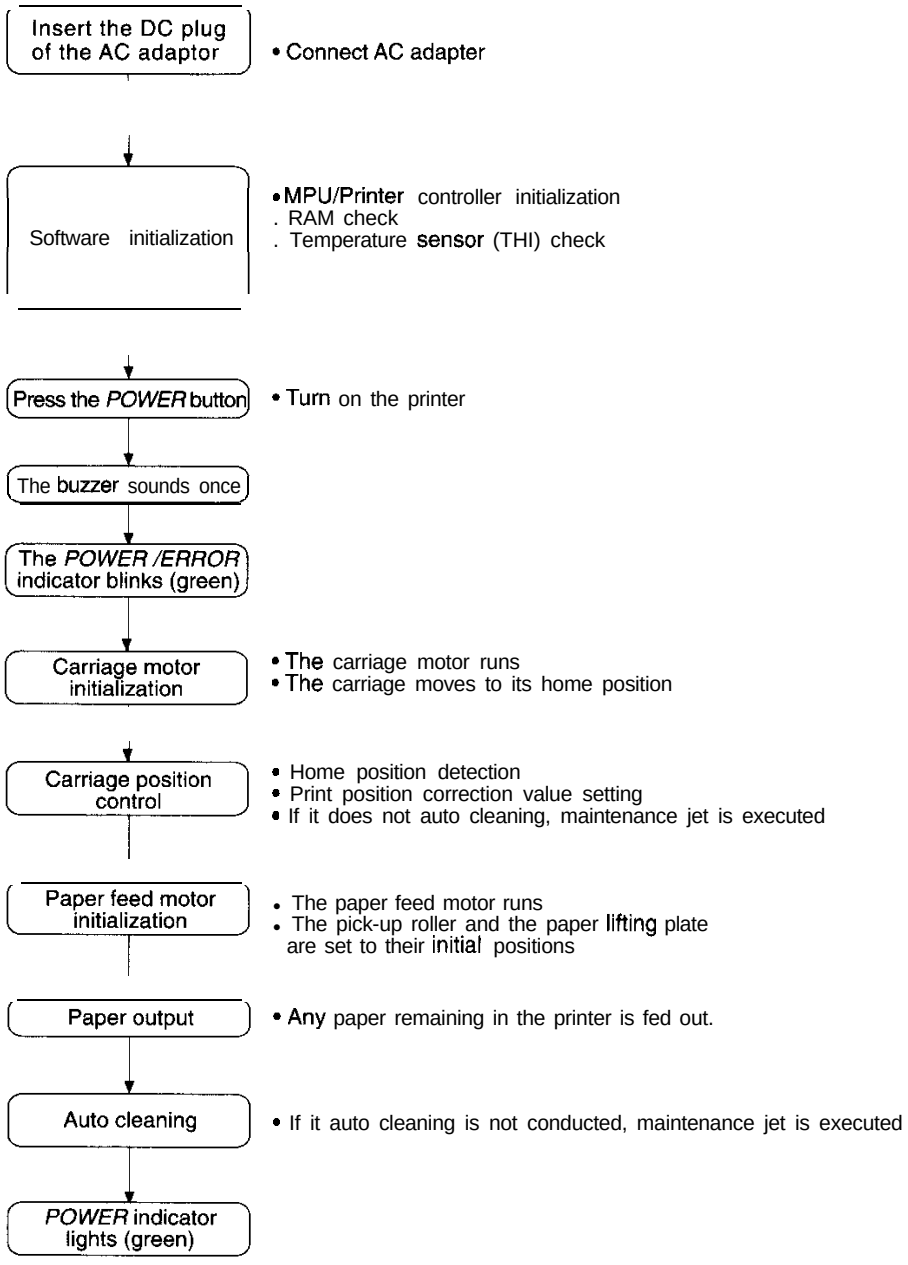

Insert the DC plug of the AC adaptor
• Connect AC adapter
Software initialization
• MPU/Printer controller initialization
. RAM check
. Temperature sensor (THI) check
Press the POWER button
• Turn on the printer
The buzzer sounds once
The POWER /ERROR indicator blinks (green)
Carriage motor initialization
• The carriage motor runs
• The carriage moves to its home position
Carriage position control
• Home position detection
• Print position correction value setting
• If it does not auto cleaning, maintenance jet is executed
Paper feed motor initialization
• The paper feed motor runs
• The pick-up roller and the paper lifting plate are set to their initial positions
Paper output
• Any paper remaining in the printer is fed out.
Auto cleaning
• If it auto cleaning is not conducted, maintenance jet is executed
POWER indicator lights (green)

Figure 4-2 Initial Flowchart

1.3 Print Signal Flow

The print signal flow from when the printer receives the print data to when printing is executed is described below.

a) The print data (including the control signals) output by the computer is received by the printer controller through the parallel interface, which is controlled by the printer controller on the logic board. Through the dedicated bus between the printer controller and DRAM, print data is stored in the DRAM's receive buffer area.

b) The print data in the receive buffer is sent to the MPU and separated into control commands and print data based on the data stored in the control ROM. The control commands are processed in the MPU.

c) The print data is stored in the DRAM's print buffer.

d) When the printer controller receives the command from the MPU to start printing, it receives print data (by DMA transfer) stored in the DRAM's print buffer.

e) The printer controller converts the print data into serial data as print drive signals and outputs the serial data to the bubble jet head. In the bubble jet head, the print data is converted from serial signals to parallel print data for each printed line. Printing is executed while the printer controller is controlled by the print control signals.

f) The MPU controls the entire printing process by controlling the printer controller, and motor drivers and monitoring the status of the bubble jet head and printer.

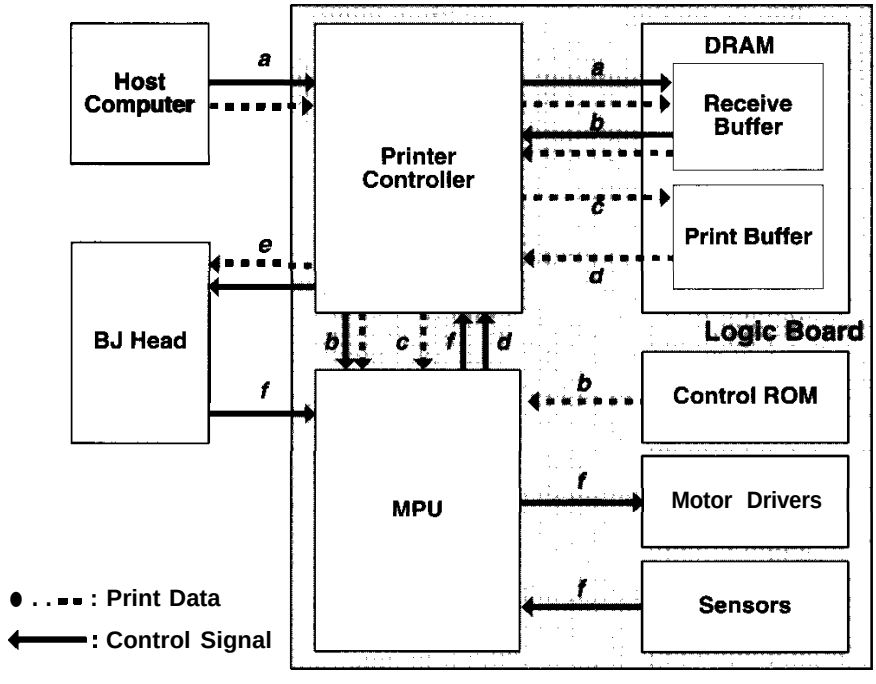


Figure 4-3 Printing Signal Flow

1.4 Print Drive

To eject ink from the head for printing, the printer outputs control signals from the printer controller to the BJ head.

The control signals consist of the drive control signal for ejecting ink from the head's nozzles and the temperature control signal for adjusting the head's temperature so that the amount of ink ejected is uniform.

To achieve optimum printing, both these control signals are optimized by the printer controller and sent from the carriage ribbon cable's signal contacts to the BJ head.

The drive frequency varies depending on the printing mode and BJ cartridge type.

1.4.1 Printing drive control

a) Black BJ cartridge drive control

The black BJ cartridge drive control is executed by dividing the head's 128 nozzles into 8 blocks (16 nozzles each). These blocks are further divided into odd and even blocks (8 nozzles each). The odd blocks eject ink simultaneously and the even blocks do so as well. The control signals for the former are the block enable 1, 2, and 3 signals (BENB 1, 2, 3) and for the latter the signals are the even/odd enable signals (Even/odd ENB).

The heat enable 0 and 1 (HENB 0, 1), which are the heater drive control signals for ejecting the ink. comprise of a pre-pulse and main pulse. To constantly achieve optimum ink ejection, the internal conditions such as the head's rank, printer temperature, and head temperature are monitored and the heater drive pulse width is varied before the pulse is output. Furthermore, the print drive signal from the printer controller is transferred to the BJ head's shift resistor according to the HLATCH timing. The printing drive signal (HDATA) is latched and when the print control and heater drive control signals are output together, the heater for the applicable nozzles is driven and the ink is ejected.

b) Color BJ cartridge drive control

The color BJ cartridge head's nozzle configuration differs from that of the black BJ cartridge. (The black has 64 nozzles while the color has 24 nozzles each for Y, M, and C.) Therefore, the number of nozzles in each control block is different from that of the black BJ cartridge. Furthermore, since the heaters are driven simultaneously for each color, the heater drive control signals used are the heat enable (HENB) 0, 1, 2. and 3 signals. All other operations are the same as for the black BJ cartridge.

For heat enable, the HENB 0, 1, and 2 signals drive the nozzle heaters for Y, M, and C. The HENB 3 signal drives the nozzle heater for black ink.

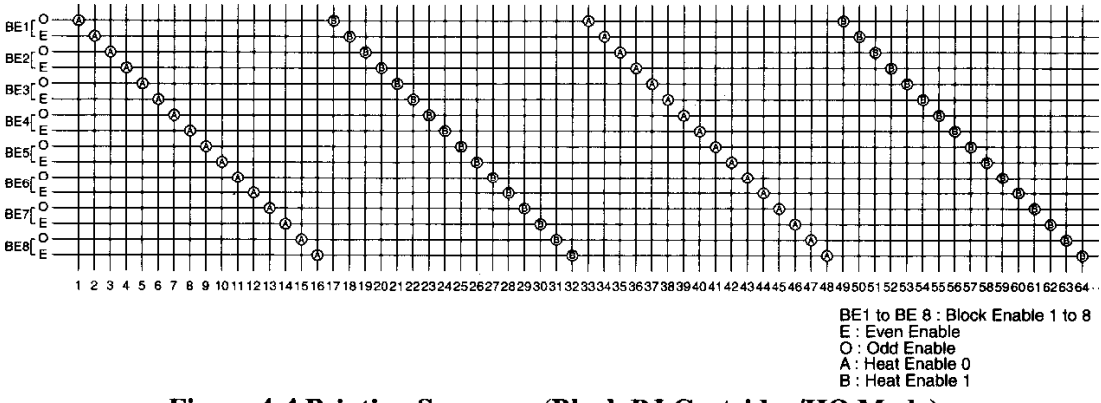


Figure 4-4 Printing Sequence (Black BJ Cartridge/HQ Mode)

c) Color BJ Cartridge (Multi Drop) Drive Control

The multi drop type color BJ cartridge's printhead has 136 nozzles and each nozzle has two heaters located one infront of the other. The printing operation using this multi drop type color BJ cartridge is (dependent/influenced] by how these heaters are controlled.

The sequence of ink ejection is as follows. The 136 nozzles has 8 function blocks (16 nozzles/block) and each block is separated into two functional units. Hence, each functional unit has 8 nozzles. Ink is consecutively ejected from each unit.

Selection of the nozzles to be ejected is done by BLOCK ENABLE signals 1, 2 and 3 (BENB 1,2,3) and the EVEN/ODD ENABLE signal (Even/Odd ENB). HEAT ENABLE (HENB 0,1,2,3) is the heat drive control signal for ejecting ink.

The HEAT ENABLE signal controls ink ejection as follows:

HENB 0: signals the nozzle (black) at the back
HENB 1: signals the nozzle (black) at the front
HENB 2: signals the nozzle (color) at the front
HENB 3: signals the nozzle (color) at the back

The HEAT ENABLE signal is made up of the prepulse and the main pulse. To optimize ink ejection, the head rank, printer's inner temperature and head temperature is constantly monitored. The ink is ejected by varying the HEAT ENABLE pulse width.

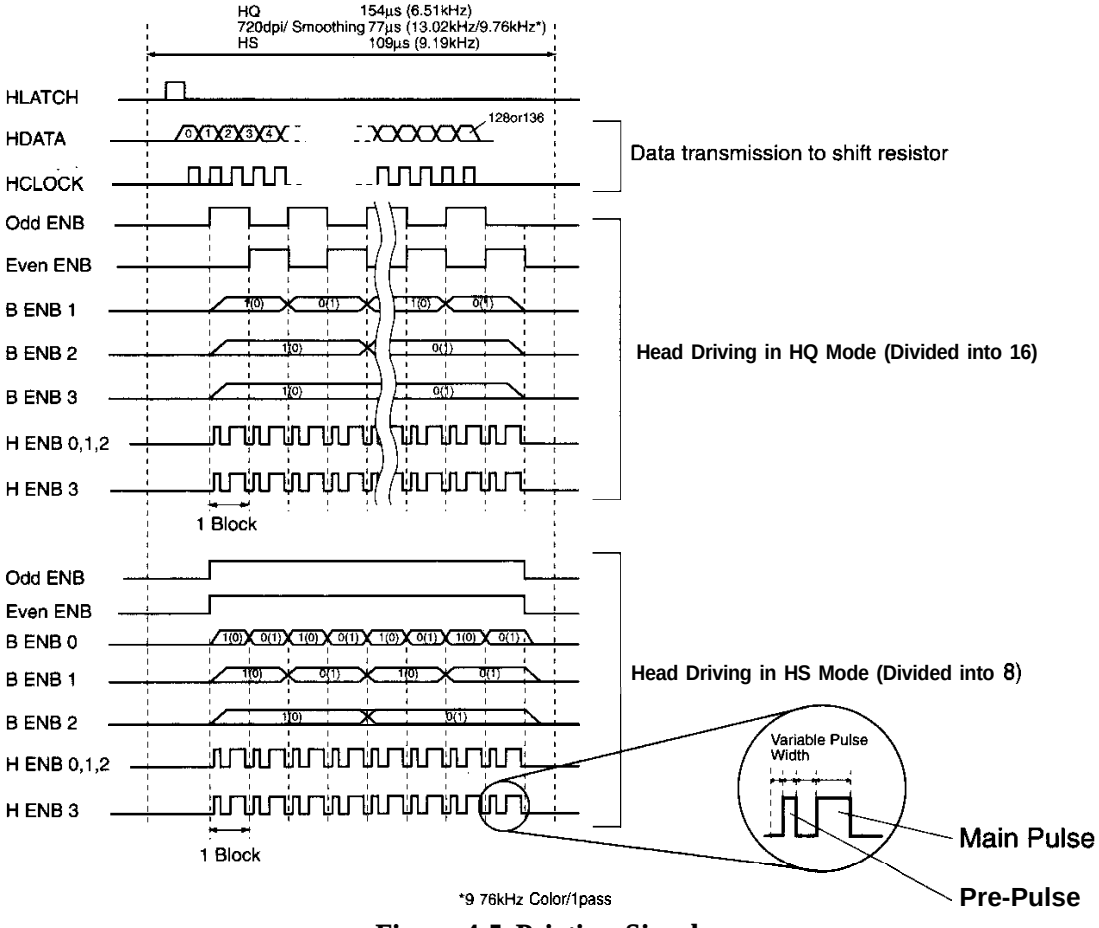


Figure 4-5 Printing Signals

1.5 Power Off Flowchart

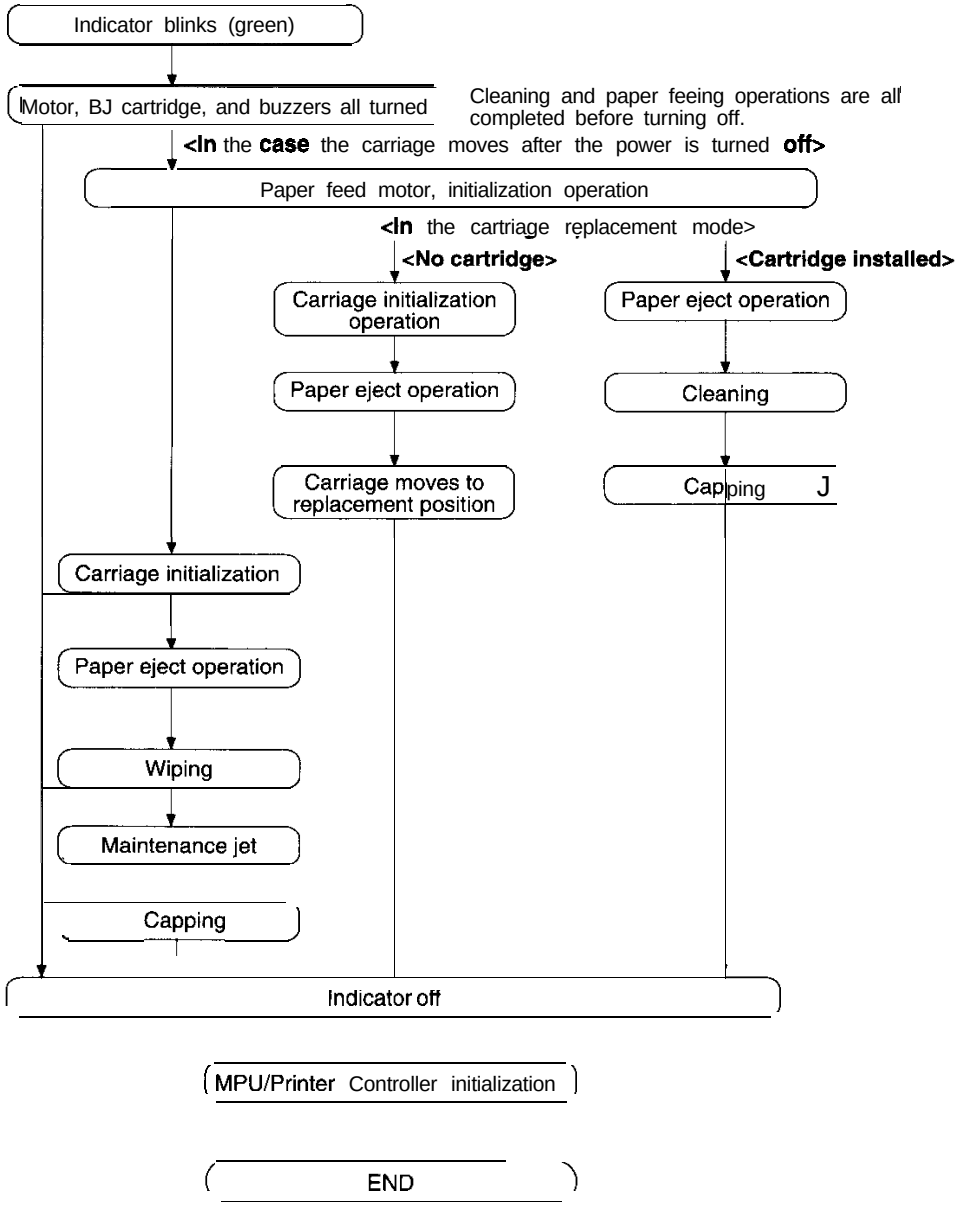


Figure 4-6 Power off Flowchart

CAUTION

If the DC power cord or AC adapter is disconnected before the printer is turned off with the POWER button, the cartridge head might not be capped. In this case, reconnect the DC power cord, start up the printer again, then turn off the printer with the POWER button. The DC power cord or AC adapter may then be disconnected.

2. FIRMWARE

2.1 Interface

The printer supports compatible mode and nibble mode which are compatible with the bidirectional Centronics interface-standard [IEEE P1284).

Compatible mode is the same as the Centronics interface-standard protocol.

The printer supports compatible mode and ECP mode which are compatible with the bidirectional Centronics interface-standard (IEEE P1284).

Compatible mode is the same as the Centronics interface-standard protocol.

When the printer is used in the printer mode, it only supports data transfer in compatible mode. It does not support the ECP mode and nibble mode which enable high-speed data transmission and reception.

The nibble mode and the ECP mode which supports high speed data transfers have bidirectional compatible data buses. These modes are used when status data such as device ID and printer status as well as scanned data read from the optional scanner cartridge are transferred to the host computer. However, the setting in the host computer must be nibble mode or ECP mode to be applicable.

2.1 .1 Compatible mode

The parallel interface for the compatible mode transfers data in S-bit units. Data is transferred with the $\overline{\text{STROBE}}$, BUSY, and $\overline{\text{ACKNLG}}$ handshake signals.
When the printer receives the data (Data 1-8) and $\overline{\text{STROBE}}$ signal from the host computer and the $\overline{\text{STROBE}}$ signal is low, the printer controller (which controls the parallel interface) outputs the BUSY signal and latches the data. After the BUSY signal is output, the printer controller sends the latched data from the DRAM bus to the receive buffer in the DRAM. After the data is completely written into the receive buffer in the **DRAM**, the printer controller outputs the $\overline{\text{ACKNLG}}$ signal and sets the BUSY signal to "Low." Then it watts for the next data input from the host computer.

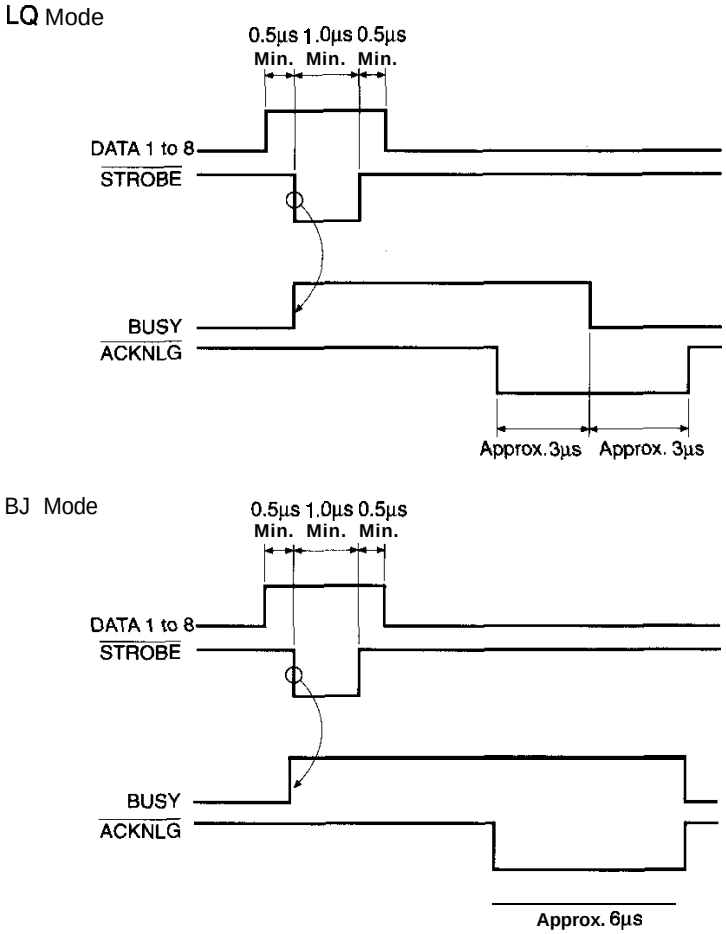


Figure 4-7 Interface Timing (Compatible Mode)

2.1.2 Nibble mode

In nibble mode, the printer transfers data twice to the host computer in 4-bit units. The data is transferred with the PtrClk signal and HostBusy signal handshakes. After the printer confirms that the HostBusy signal is low, it prepares S-bit data, lowers the PtrClk signal and outputs the lower 4-bits along the control signal line. After the PtrClk signal is low, the host computer receives the data and raises the HostBusy signal. Next, after the printer confirms that the HostBusy signal is low for a second time, it outputs the upper 4-bits along the control signal line. If there is no data to be sent to the host computer after the HostBusy signal is high, the DataAvail signal becomes high and the printer stands by for the next data transfer.

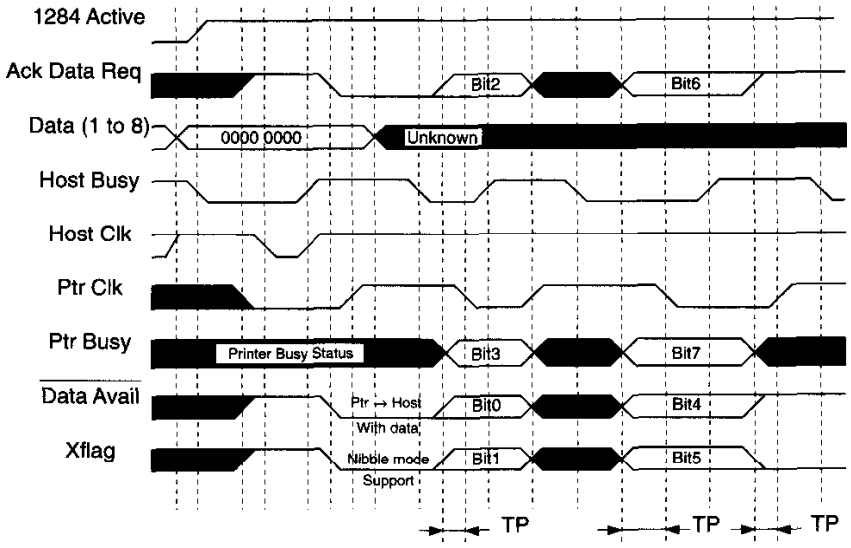


Figure 4-8 Interface Timing (Nibble Mode)

2.2 720 dpi Printing/Smoothing Feature

2.2.1 Canon extension mode

In Canon extension mode, the printer driver creates 720 dpi data for the horizontal direction and sends it to the printer, allowing the printer to achieve high-quality printing.

With a black BJ cartridge installed, the printer driver smoothes the printed character's edges to 720 dpi along the horizontal direction. The 720 dpi data for the horizontal direction is sent to the printer and the edges are smoothed at a higher resolution.

When a color BJ cartridge is installed, a 360 dpi data is represented by a set of two dots printed simultaneously to obtain a 720 dpi resolution. The multi-value data of the pixels processed by the printer driver for color correction, etc., is assigned three values (no printing, single-dot printing, two-dot printing) for each pixel. In the case of two-dot printing, the second dot is printed in the 720 dpi position. As a result, this method enables the printer to achieve high degree gradation printing.

2.2.2 Emulation mode

When a black BJ cartridge is installed, the printed character's edges can be smoothed at a high resolution of 720 dpi along the horizontal axis. Dots along the character's edges are added or deleted to smooth their edges. Along the horizontal axis, dots are also overlapped by half a dot. This eliminates jaggies and doubles the equivalent horizontal resolution.

This smoothing feature greatly improves low-resolution, 180 dpi characters. However, it does not give noticeable improvement to True Type fonts and illustrations.

Note that with a color BJ cartridge installed, the emulation mode smoothing feature cannot be used.

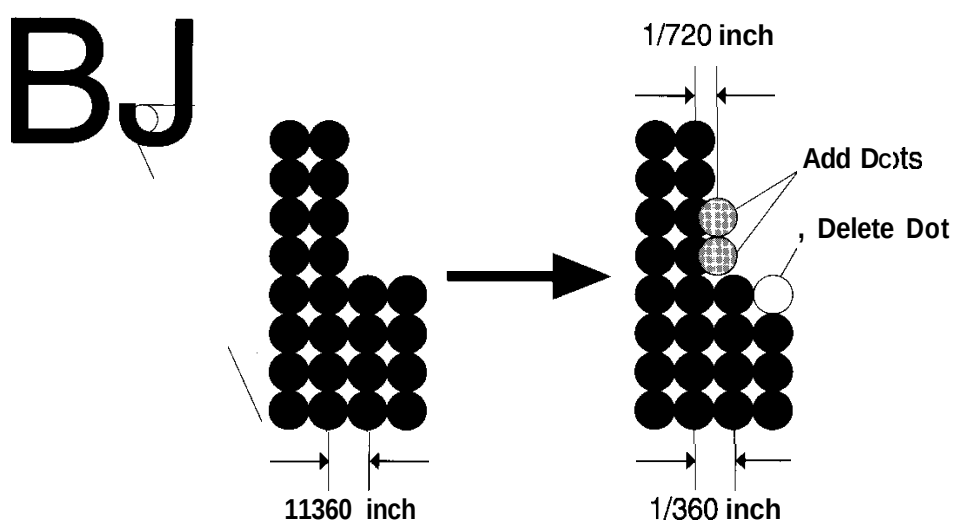


Figure 4-10 720 dpi Printing/Smoothing Feature

2.3 Printing Modes

2.3.1 Printing mode

Depending on the cartridge installed, the medium, the printing mode, the resolution, the print data, etc., the printer varies the carriage movement, bubble jet head driving frequency, etc., to attain high-quality printing without any bleeding or shifting in the printout.

When the 720 dpi printing/smoothing feature is used, the carriage feed pitch is set to 1/720 inch. Although this slows down the carriage speed, the bubble jet head drive frequency (ink ejection frequency) is increased so that the overall printing throughput decreases.

During color printing at a single pass, the different colors printed at the same time overlap, often causing the colors to run. By printing with three passes, color bleeding is less prone to occur since the color printed immediately before is stable by the time the next color is printed over it.

When print data is processed internally by the printer, the data is recognized and the number of ink nozzles to be used by the black ink is changed automatically.

For color printing with Color-HQ2, at 720 dpi, processing is executed in such a way to prevent the color and black inks from running at their mutual borders and to prevent white mist.

This processing is executed as follows:

During internal processing by the printer, the borders where the color and black inks meet are identified. Cyan and black ink are mixed in the printed black portion to suit the state of the distance and density of the black and color dots.

The printing method for the respective printing modes are listed below.

2.3.2 Photo print mode

Photoprint mode can be used to obtain high level gradation print quality when using the Photo BJ cartridge. These cartridges contain a light density ink which achieves a high level of gradation by printing several times over the same dot.

The printer driver divides the pixel data into a maximum of 4-values (not printed, print 1 dot, print 2 dots and print 3 dots) enabling each pixel to be printed in up to 4 gradations. The printer therefore makes three passes using a maximum of 150% more ink than usual.

It is therefore necessary to use the exclusive print driver when printing with the Photo BJ cartridge.

The exclusive printer driver outputs multiple print data to the printer when photoprinting. If for some reason, a standard color BJ cartridge is installed and used for photoprinting, everything printed will be doubled in size in the carriage direction. On the other hand, if color printing is performed with a Photo BJ cartridge, not only will printed images appear light, the user will be notified of a mis-match as images will be printed in half their normal size.

2.3.3 Multi drop print mode

When a color cartridge or a photo color cartridge using drop modulation technology is installed, a Canon original driver must be used. By selecting a drop modulation mode such as fine or photo mode, large and small ink droplets can be printed. When large and small dots arc used efficiently, the granularity of the light areas can be improved. To avoid slowdown, large and small droplet printing is not used for the emulation, HQ and HS modes since these modes do not give a gradation.

TABLE 4-1 PRINTING MODES AND HEATING METHODS (1)

With a Black BJ Cartridge

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*1]
Bk-HQ	1 pass	128 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine1	4 passes	32 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine2	4 passes	32 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine-Cloth	4 passes	32 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-HQ1	1 pass	128 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-HQ2	1 pass	128 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-Fine1	4 passes	32 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-Fine2	4 passes	32 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-HS	1 oass	128 nozzles	9.19KHz

With a Color BJ Cartridge (Multi Drop)

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*1]
Bk-HQ	1 pass	64 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine1	4 passes	16 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine2	4 passes	16 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-DFine1	4 passes	16 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-DFine2	4 passes	16 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-HS	1 pass	64 nozzles for black	9.19KHz
Color-HQ1	1 pass	Switches automatically between 24 or 64 nozzles	6.51KHz [4.88KHz (9.76KHz)]
Color-HQ2	1 pass	Switches automatically between 24, or 64 nozzles'*	6.51KHz [4.88KHz (9.76KHz)]
Color -Fine 1	3 passes	8 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-Fine2	3 passes	8 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-DFine 1	3 passes	8 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-DFine2	3 passes	8 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-HS	1 pass	Switches automatically between 24 or 64 nozzles	9.19KHz

With a Photo BJ Cartridge (Multi Drop)

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*1]
Bk-HQ	1 pass	64 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine 1	4 *asses	16 nozzles for black	6.51KHz [5.21KHz (10.42KHz)]
Bk-Fine2	4 passes	16 nozzles for black	6.51KHz [5.21KHz (10.42KHz)]
Bk-DFine1	4 passes	16 nozzles for black	6.51KHz [5.21KHz (10.42KHz)]
Bk-DFine2	4 passes	16 nozzles for black	6.51KHz [5.21KHz (10.42KHz)]
Bk-HS	1 pass	64 nozzles for black	9.19KHz
Color-HQ 1	1 pass	Switches automatically between 24 or 64 nozzles	6.51KHz [4.88KHz (9.76KHz)]
Color-HQ2	1 pass	Switches automatically between 24, or 64 nozzles'*	6.51KHz [4.88KHz (9.76KHz)]
Color-Fine 1	3 passes	8 nozzles	6.51KHz [5.21KHz (10.42KHz)]
Color-Fine2	3 passes	8 nozzles	6.51KHz [5.21KHz (10.42KHz)]
Color-DFine1	3 passes	8 nozzles	6.51KHz [5.21KHz (10.42KHz)]
Color-DFine2	3 passes	8 nozzles	6.51KHz [5.21KHz (10.42KHz)]
Color-HS	1 pass	Switches automatically between 24 or 64 nozzles	9.19KHz

*1 [1: Carriage speed (heat frequency) for 720 dpi printing/smoothing.

*2 When the print resolution is 720 dpi, processing to prevent colors running at the borders is not executed.

TABLE 4-2 PRINTING MODES AND HEATING METHODS (2)

With a Color BJ Cartridge

Printing Mode	-Carriage Movement	Number of Nozzles	Heat Frequency [*1]
Bk-HQ	1 pass	64 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine1	4 passes	16 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine2	4 passes	16 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-HS	1 pass	64 nozzles for black	9.19KHz
Color-HQ 1	1 pass	Switches automatically between 24 or 64 nozzles	6.51KHz [4.88KHz (9.76KHz)]
Color-HQ2	1 pass	Switches automatically between 24, or 64 nozzles*2	6.51KHz [4.88KHz (9.76KHz)]
Color-Fine1	3 passes	8 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-Fine2	3 passes	8 nozzles	6.51KHz [6.51KHz (13.02KHz)]
Color-HS	1 pass	Stitches automatically between 24 or 64 nozzles	9.19KHz

With a Photo BJ Cartridge

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*1]
Bk-HQ	1 pass	64 nozzles for black	6.51KHz [6.51KHz (13.02KHz)]
Bk-Fine 1	4 passes	16 nozzles for black	6.51KHz [5.21KHz (10.42KHz)]
Bk-Fine2	4 passes	16 nozzles for black	6.51KHz [5.21KHz (10.42KHz)]
Bk-HS	1 pass	64 nozzles for black	9.19KHz
Color-HQ 1	1 pass	Switches automatically between 24 or 64 nozzles	6.51KHz [4.88KHz (9.76KHz)]
Color-HQ2	1 pass	Switches automatically between 24, or 64 nozzles'*	6.51KHz [4.88KHz (9.76KHz)]
Color-Fine 1	3 passes	8 nozzles	6.51KHz [5.21KHz (10.42KHz)]
Color-Fine2	3 passes	8 nozzles	6.51KHz [5.21KHz (10.42KHz)]
Color-HS	1 pass	Switches automatically between 24 or 64 nozzles	9.19KHz

* 1 []: Carriage speed (heat frequency) for 720 dpi printing/smoothing.

*2 When the print resolution is 720 dpi, processing to prevent colors running at the borders is not executed.

2.4 Optimum Printing Direction Control

To prevent vertical misalignment of the printed characters, etc., when printing data is printed continuously in the direction of the paper feeding direction, printing is executed with the carriage moving from only one direction.

However, when printing in the paper feed direction is not continuous, since vertical misalignment is not so noticeable the printing direction is alternated so that printing is also executed from the opposite carriage direction. This improves the throughput.

If four or more successive null rasters are detected in the lower (in the direction of paper ejection) 64 nozzles (24 nozzles with a color BJ cartridge) for the print data in the printer buffer during single-pass printing, printing is executed up to the null raster. From the null raster onward, printing is executed from the opposite carriage direction. From the next raster onward, printing is executed from the same carriage direction until the direction changes again.

2.5 Automatic Emulation Switching

The printer analyzes the control command received from the host computer and determines whether it is BJ or LQ mode. The emulation mode is thereby switched automatically. The BJ setup utility program can be used to turn on or off the automatic switching of the emulation mode.

Control command recognition

By recognizing the control command received from the host computer, the printer can determine which emulation mode to set. The printer determines the emulation mode when the control command is received at any of the following times: After the power is turned on and no print data has been received, when no print data has been received for over 10 seconds, or when the printer has no print data.

Switching the emulation mode

The emulation mode is switched automatically at any of the following times:
When the printer has received over 5 12 bytes of data, when the data reception (even for data less than 512 bytes] has been interrupted for over 3 seconds, or when the power has been turned off before over 5 12 bytes of data is received or before over 3 seconds of data reception.

Upon shipment from the factory or when the EEPROM is reset, it is set as "Invalid". Immediately after is set to "Valid", the emulation mode that was set immediately before well be valid.

There are control commands with which the printer cannot determine the emulation mode to set. If the emulation mode set automatically is not the correct one, use the BJ setup utility program or the manual default setting to cancel the automatic switching of the emulation mode and set the emulation mode manually.

2.6 Ink Smear Control

Immediately after the printed sheet is ejected from the printer, the ink dries naturally on the paper output tray. If the next printed sheet is ejected before the ink has enough time to try on the preceding sheet on the paper output tray, the ink may be smeared when the sheet slides over the preceding one. To prevent this, a wait period is applied during printing so that the sheet is delayed being ejected, giving more time for the ink on the preceding sheet to dry.

When a black BJ cartridge is used (whose printing speed is faster) and. high duty printing is completed, the printer automatically detects the high duty printing position and the time elapsed from the start of printing.

There is no need to execute ink smear control when a color BJ cartridge is used.

2.7 Head Overheating Protection Control

If the ink has run out and the printing operation is continued, the bubble jet head can get extremely hot. If the head temperature sensor in the bubble jet head detects a temperature above the temperature limit, head overheating control is executed.

Protection level 1:

This level prevents the user from touching the bubble jet head's hot aluminum plate when the bubble jet head is replaced. When the user tries to manually move the carriage to the cartridge replacement position, the beeper will sound three times and the cartridge cannot be replaced. Depending on the protection level, the user may even be prevented from replacing the cartridge until a set period of time passes.

Protection level 2:

If a still higher temperature is detected, the carriage is returned to the home position for 3.5 seconds to bring down the temperature. After the resting period, printing will resume. This continues for over 20 seconds to lower the bubble jet head's temperature.

Protection level 3:

If the temperature continues to Increase, a head temperature error occurs. This stops the printing operation. If this still does not lower the head temperature, the sensor is deemed faulty and a head temperature sensor error will be indicated.

2.6 Auto Power On/Off

This printer is turned on with print signals sent from the host computer, and is automatically turned off when print signals are not received after a specified period of time. These settings can be made separately from the printer driver or BJ setup utility program.

When the auto-power on function is set as valid, the STROBE signal is sent three times in succession turning the printer on. Therefore the interface is constantly valid even when the power is off.

With the auto-power off set as valid, the printer is turned off if print data is not received for a set period of time.

The valid times are 1, 10, 30 and 60 minutes.

3. PRINTER MECHANICAL SYSTEM

3.1 Overview

This section explains the printer's mechanical components.

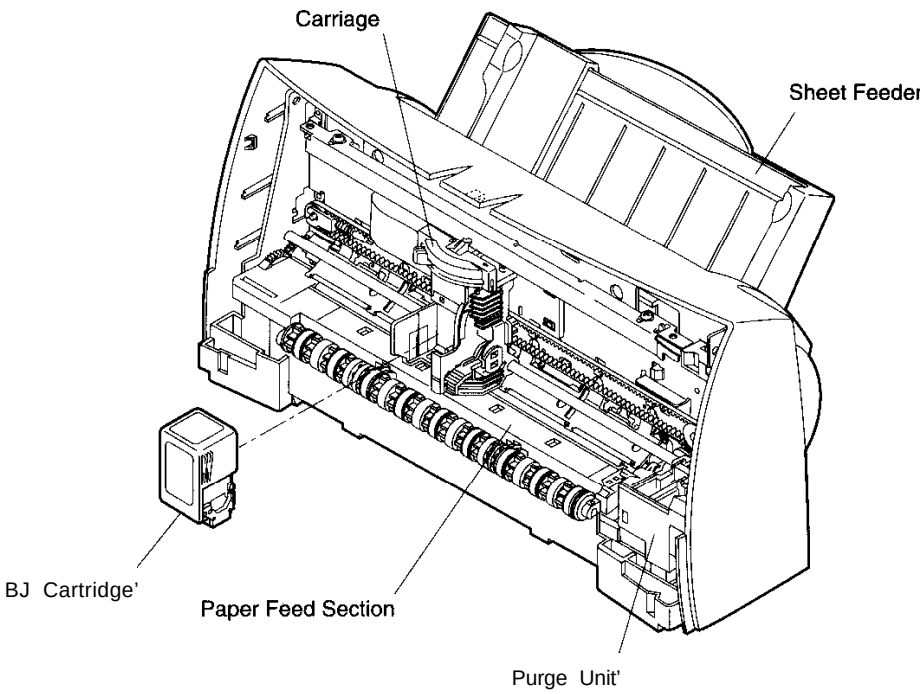


Figure 4-11 Printer's Mechanical Configuration

3.1 .1 Mechanical components

1) BJ cartridge

The printer comes with three types of BJ cartridges: black, color and photo. The user installs the black or color BJ cartridge according to the required application. The black BJ cartridge has an integrated head while the color BJ cartridge has replaceable ink cartridges.

2) **Purge unit**

Driven by the carriage motor, the purge unit helps to maintain high-quality printing by capping and wiping the BJ cartridge's bubble jet face. It ensures that the ink in the nozzles is ejected easily.

When the printer is not in use, the purge unit caps the BJ cartridge's nozzles for protection.

3) carriage

Driven by the carriage motor, the carriage moves horizontally across the paper. Through the carriage ribbon cable, the printing signals from the logic board are transmitted to the BJ cartridge in the carriage.

By controlling the purge unit's slide lock pin, the carriage controls the engagement of the paper feed motor's drive power between the paper feed/purge unit and the sheet feeder.

4) Paper feed mechanism and sheet feeder

The built-in sheet feeder is driven by the paper feed motor. Plain paper as well as coated paper, transparencies. back print film, envelopes, etc., can be loaded and fed automatically into the paper feed mechanism.

Driven by the paper feed motor, the paper feed mechanism rotates the feed rollers to feed the paper vertically.

When printing transparencies and back print film, remove each sheet from the paper output tray immediately after it is printed. This is to allow enough time for the ink to dry.

All paper feed operations can be executed with the RESUME **button.**

3.2 BJ Cartridge

3.2.1 Black BJ cartridge structure

The black BJ cartridge consists of a 128 nozzle print head and integrated ink cartridge.

1) Pressure adjusting plate

As the ink is consumed, the pressure inside the cartridge decreases in relation to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To prevent this, the BJ cartridge has an air hole for maintaining a constant pressure inside the cartridge body.

2) **Cartridge cover**

The plastic cover is attached to the cartridge body to prevent the ink from leaking inside the cartridge.

3) Ink sponge

The sponge is soaked with black ink. It is compressed and stored in the cartridge body.

4) **Cartridge body**

The plastic case connects the ink sponge with the bubble jet head unit via the ink filter.

5) **Bubble jet head unit**

Ink is ejected through the 128 bubble jet nozzles, according to the print signals received through the signal contact.

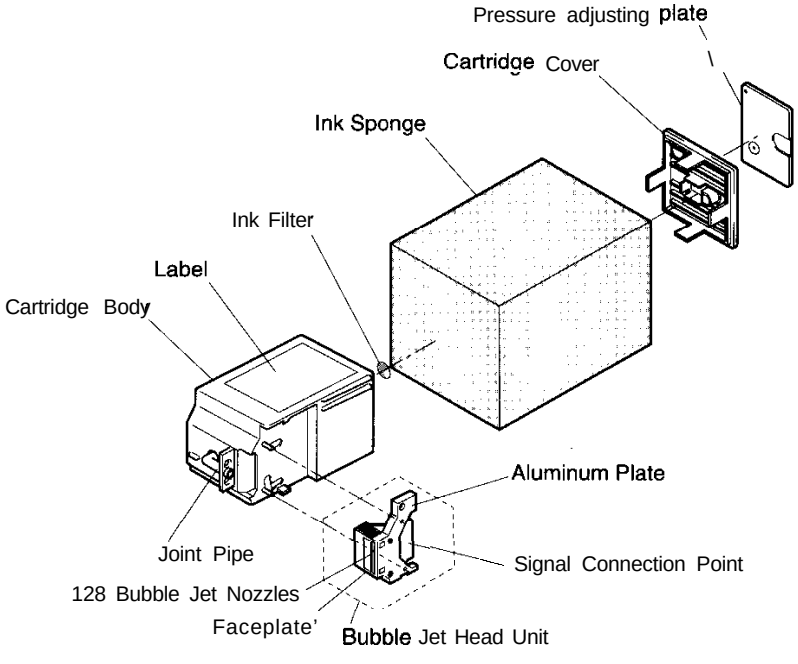


Figure 4-12 Black BJ Cartridge Structure

3.2.2 Color BJ cartridge structure

The color BJ cartridge has a print head equipped with 136 nozzles through which the four ink colors are ejected (24 nozzles each for yellow, magenta. and cyan: 64 nozzles for black). The ink cartridges (one for black and one for the other three colors) are removable and replaceable.

1) Pressure adjusting plates

As the ink is consumed, the pressure inside the cartridge decreases in relation to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To prevent this, the ink cartridge has an air hole for maintaining a constant pressure inside the cartridge body.

2) **Ink sponges**

Each Ink color (black, cyan, yellow, magenta) is soaked in its own respective sponge. The cyan, yellow, and magenta ink sponges are compressed and stored in the same color ink cartridge body.

3) Ink suppliers

These supply the ink from the ink sponges to the cartridge's joints at a constant pressure.

4) **Ink cartridge body**

This is a plastic case which links the ink sponge with the color BJ cartridge via the ink suppliers.

5) Rubber sheet

This sheet seals the joints between the ink cartridge and BJ cartridge.

6) Ink passage section

This is a passage through which the ink flows from the ink cartridge to the head unit.

7) **Bubble jet head unit**

From the ink cartridges, the four ink colors are supplied separately to the 136 bubble jet nozzles. Ink for the four colors is ejected through the 136 bubble jet nozzles, according to the print signals received through the signal contacts.

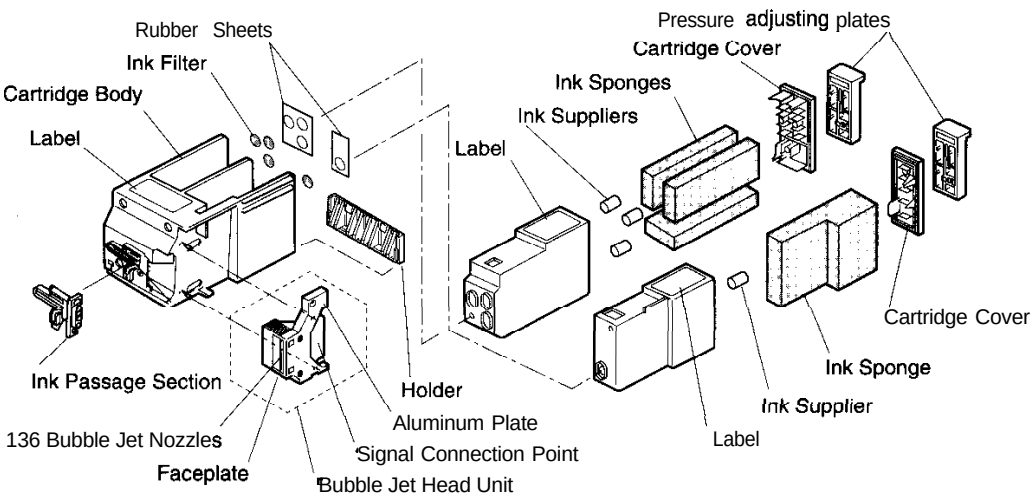


Figure 4-13 Color BJ Cartridge Structure

3.2.3 Photo BJ cartridge structure

The photo BJ cartridge has a print head equipped with 136 nozzles through which the four ink colors are ejected (24 nozzles each for yellow, magenta, and cyan; 64 nozzles for black).

1) **Pressure adjusting plate**

As the ink is consumed, the pressure inside the cartridge decreases in relation to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To prevent this, the ink cartridge has an air hole for maintaining a constant pressure inside the cartridge body.

2) **Ink sponges**

Each ink color (black, cyan, yellow, magenta] is soaked in its own respective sponge. The cyan, yellow, and magenta ink sponges are compressed and stored in the cartridge body.

3) Rubber sheet

This sheet seals the joints between the ink cartridge and BJ cartridge.

4) Ink passage section

This is a passage through which the ink flows from the ink cartridge to the head unit.

5) Bubble jet head unit

From the ink cartridges, the four ink colors are supplied separately to the 136 bubble jet nozzles. Ink for the four colors is ejected through the 136 bubble jet nozzles, according to the print signals received through the signal contacts.

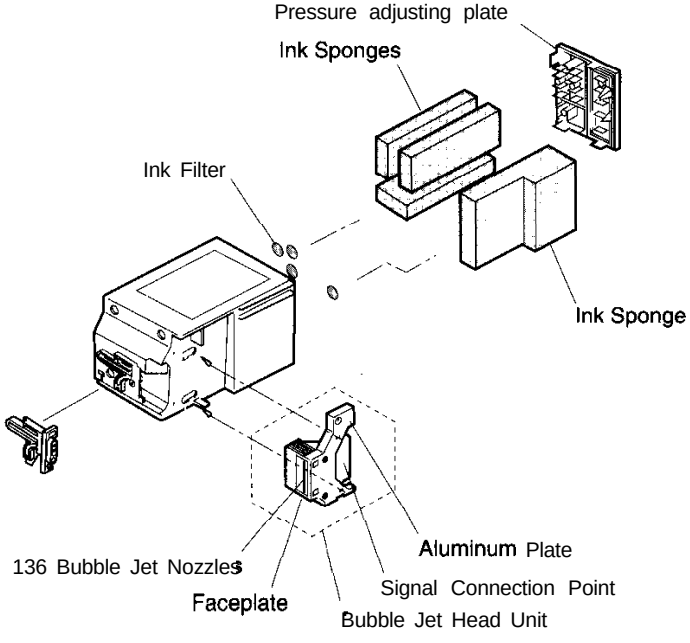


Figure 4-14 Photo BJ Cartridge Structure

3.2.4 Bubble head unit structure

1) **Bubble jet nozzles**

The ink held by the sponge goes through a mesh-type ink filter and flows to the bubble jet nozzles through the joint pipe.

When the head-drive current is supplied to the heater board, an ink bubble is produced. Eventually, only one ink bubble is formed. The head-drive current is turned off before the ink droplet leaves the nozzle. The bubbling however continues with the residual heat and the ink droplets are ejected from the nozzles.

After an ink droplet is ejected, the nozzle is replenished with more ink from the ink sponge.

NOTE

a The print head's heater board uses semiconductor technology with the heater and circuitry built on a silicon plate.
This silicon plate, which contains electrical circuitry, is attached to an aluminum base. The plastic cover, which is shaped to fit the nozzles, is also attached.

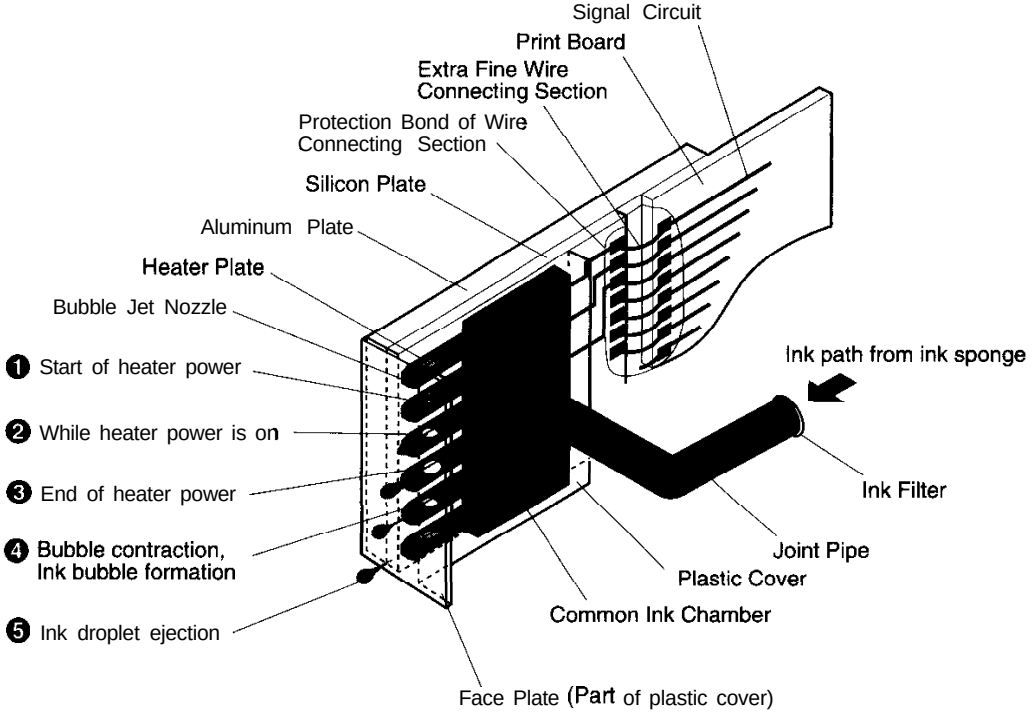


Figure 4-15 Bubble Jet Nozzles (Partial View)

2) Nozzle arrangement

The bubble jet nozzles are arranged 1/360 inch apart in a vertical array. The black BJ cartridge has 128 nozzles. On the color BJ cartridge, the first 24 nozzles are for yellow ink, the second 24 nozzles are for magenta ink, the third 24 nozzles are for cyan ink. and the remaining 64 nozzles are for black. The color BJ cartridge has a total of 136 nozzles.

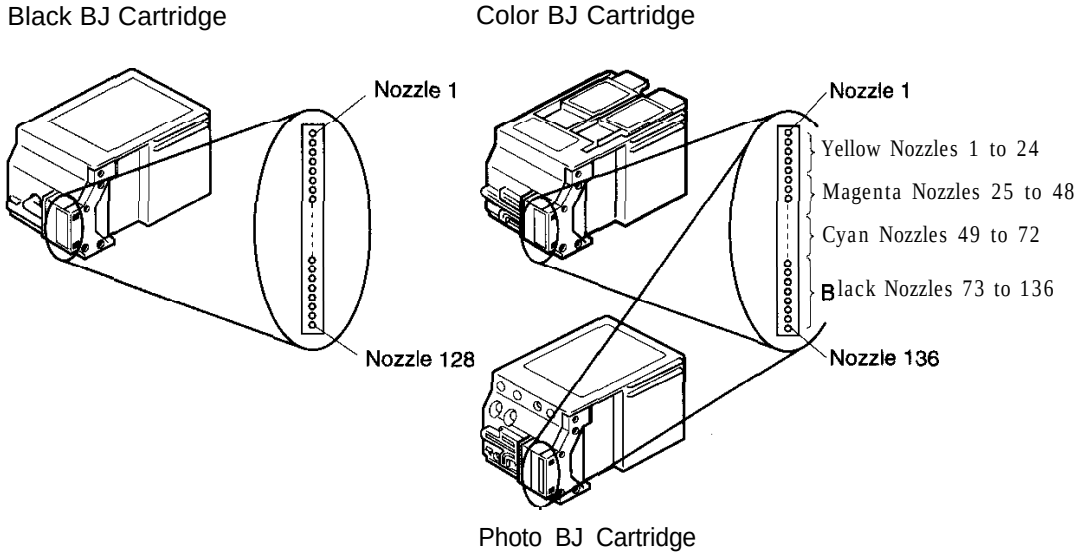


Figure 4-16 Nozzle Arrangement

3) Signal connection point (contact pad)

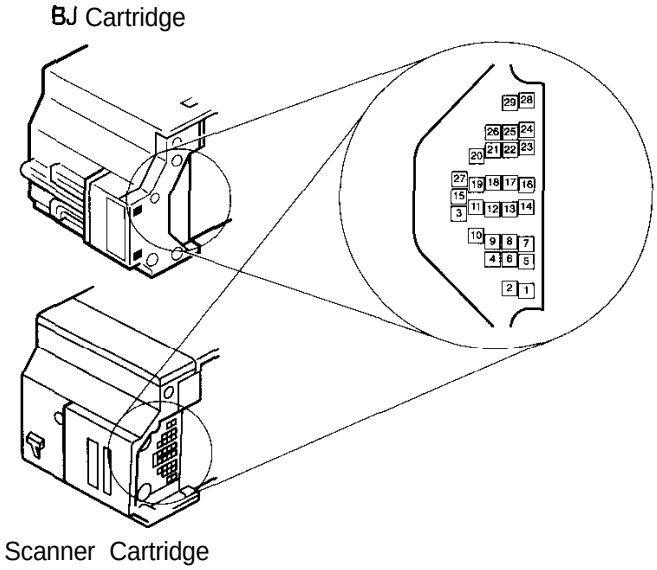


Figure 4-17 Contact Pad

TABLE 4-3 LIST OF BJ CARTRIDGE SIGNAL CONTACTS

No.	Signal	Type	Description
1, 2	VHG	GND	GND for head driver voltage VH
3	HT0	IN	Temperature control heater drive signal
4	HT1	IN	Temperature control heater drive signal
5, 6	HVH	OUT	Head drive voltage (ink ejection heater, temperature control heater, sub heater driver)
7	W-HT	OUT	Sub heater drive signal
8	INKS1		Not used
9	TOP	IN	Rank resistance detection signal
10	DIODEA	OUT	Head temperature sensor(diode) anode
11	ID0	IN	Cartridge detection and recognition signal
12	ID1	IN	Cartridge detection and recognition signal
13	INKS2	N/OUT	Cartridge detection and recognition signal
14	HVSS	GND	Head's logic drive voltage HVdd GND
15	HENBO	OUT	Heat enable
17	HENB1	OUT	Black BJ cartridge: Uses only pin No. 15 and 17 Color/Photo BJ cartridge: Uses all pins (The respective color is show in parentheses.)
27	HENB2	OUT	
18	HENB3	OUT	
16	Even ENB	OUT	Even nozzle heat enable
19	Odd ENB	OUT	Odd nozzle heat enable
20	BENB 1	OUT	Block enable decoder's output generation signal
21	BENB2	OUT	Block enable decoder's output generation signal
22	BENB3	OUT	Block enable decoder's output generation signal
23	HVdd	OUT	IC driver voltage (+5 V)
24	HCLK	OUT	Print data transfer signal
25	HLATCH	OUT	Shift resistor print data latch timing signal
26	HRES	OUT	Latch reset signal
28	HDATA	OUT	Printing data
29	DIODEK	OUT	Head temperature sensor (diode) cathode

Pin No. 1 to 29 are connected to the BJ cartridge and pin No. 30 and 31 are connected to the home position sensor.

4) Circuit diagram

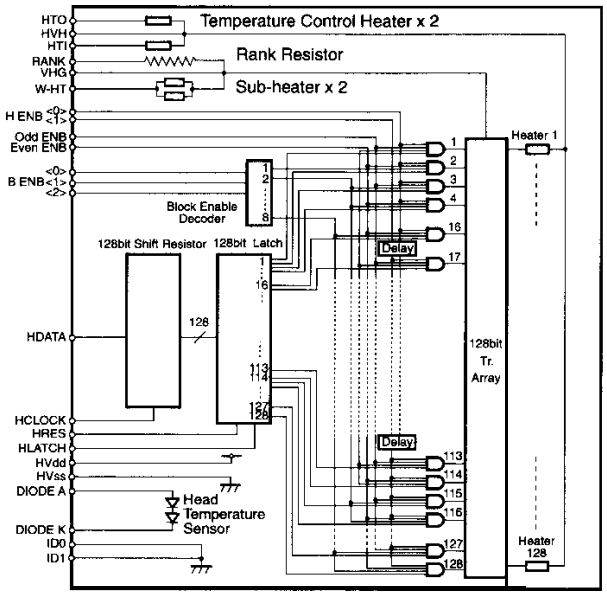
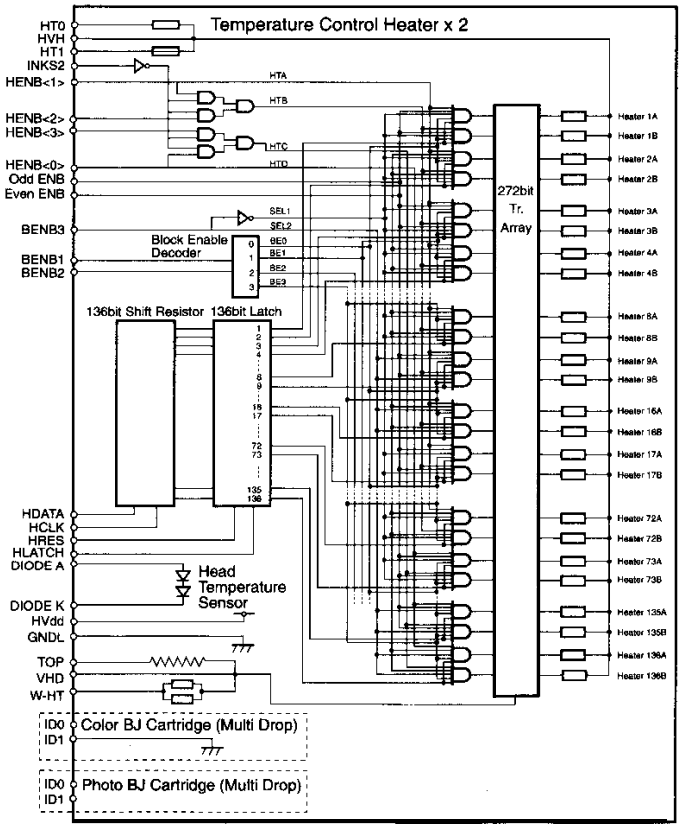
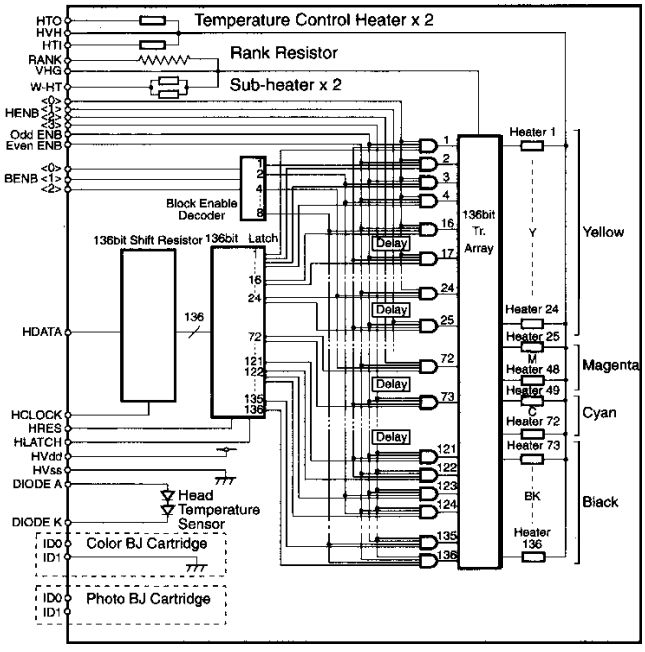


Figure 4-18 Black BJ Cartridge Block Diagram



Color BJ cartridge and Photo ❑ J cartridge have the same circuit configuration except for the ID1 connection.

Figure 4-19 Color (Multi Drop)/ Photo (Multi Drop) BJ Cartridge Block Diagram



Color BJ cartridge and photo BJ cartridge have the same circuit configuration except for the ID1 connection.

Figure 4-20 Color/Photo BJ Cartridge Block Diagram

- **128/136 bit shift resistor**
  Stores the print data [HDATA) transferred from the control board at HCLOCK's timing.

- **128/136 bit latch**
  Latches the print data (HDATA) converted by the 128/ 136 bit shift resistor.

- **Block enable decoder**
  After the BENB (Block enable) 1, 2, and 3 code signals are input, the specified heat timing signal is output. The heat timing signal is divided into eighths.

- **Heater (1 to 126 and 1 to 136)**
  The heater generates the bubbles required for the nozzles to eject the ink. The heater heats the bubble jet nozzles. Heating is executed with the timing signal produced by the block enable decoder and the even nozzle heat enable (EvenENB), odd nozzle heat enable (OddENB), and heat enable (HENBO to 3) signals.

- **Sub heater**
  This heater maintains the optimum conditions in the nozzle for ejection ink.

- Temperature **control heater**
  This heater controls the head temperature to stabilize the ink ejection amount.

- **Rank resistor**
  To execute optimum heat control of each BJ cartridge, production-related deviation in heater characteristics is classified into 13 types which are identified by changing the rank resistance. From the MPU's analog port, the MPU detects the different rank resistances as voltage values and converts them from analog to digital for detection. The heater's characteristics are thereby recognized.

- **Head temperature sensor**
  Temperature changes in the nozzle's heater are detected by the diode to prevent the bubble jet head from overheating.

- **Cartridge** ID
  The BJ cartridge type (color or black) is recognized, through combinations of ID0, ID1 and INKS2.

5) BJ cartridge detection feature

Connector pins 11, 12 and 13 (ID0, ID 1 and INKS2) are used to recognize the cartridge type and connector pins 10 and 29 are used to detect whether or not a cartridge is installed.

If the printer is turned on with no cartridge installed, the carriage automatically moves to the cartridge replacement position regardless of its previous position. Also, if the printer is on and the cartridge is removed other than during the cartridge replacement mode, an error will occur.

TABLE 4-4 HEAD INSTALLATION STATUS AND SIGNAL DETECTION

	ID0	ID1	INKS2
Black BJ cartridge installed	Low	Low	High
Color BJ cartridge (Multi Drop) installed	High	Low	Low
Photo BJ cartridge (Multi Drop) installed	High	High	Low
Scanner cartridge installed	High	Law	Low
Color BJ cartridge installed	High	Low	High
Photo BJ cartridge installed	High	High	High

High: Signal detected
Low: No signal detection (by printer)

3.3 Purge Unit

3.3.1 Purge unit functions

1) Capping function

The purge unit's cap is pressed against the face of the print head to prevent the ink from drying out or leaking.

If print data is not received for over 60 seconds during a printing operation, the purge unit wipes the print head face. If print data is still not received for a further 60 seconds, the purge unit caps the print head.

Other than during a printing operation, if print data is not received after a certain period of time (varies between 5 to 20 seconds) or if the *POWER* button is pressed to turn off the printer, the purge unit caps the print head.

2) Cleaning function

To maintain high print quality, the purge unit cleans the print head at the following times:

- When the power is turned on for the first time after the AC power cord is connected.
- After the BJ cartridge is replaced.
- After the ink cartridge has been replaced.
- When the power is turned on and it has been 72 hours since the last time the head was cleaned (or first 24 hours have been passed when a color BJ cartridge has been installed as for the initial cleaning).
- When the printed dot count exceeds the specified amount.
- When the color BJ cartridge is left at the cartridge replacement position for over 10 minutes.
- When the color BJ cartridge is at the cartridge replacement position and the printer is turned off with the *POWER* button.
- When cleaning is executed with a button operation.

The cleaning operation includes the wiping of paper bits and ink residue adhering to the print head's face plate. It also sucks out ink from the print head to refresh the inside of the nozzles with fresh ink.

TABLE 4-5 INK CONSUMPTION DURING CLEANING (AS A STANDARD)

With a Black BJ Cartridge	Approximately Ink Consumption
During black BJ head replacement	0.15g
First-time power on after AC power cord connection	0.15g
During black BJ cartridge replacement	0.15g
Power on after 72 hours since last cleaning	0.15g
When dot count exceeds the set count	0.15g
Button pressed for cleaning	0.15g

With a Color BJ Cartridge/ Photo BJ Cartridge	Approximately Ink Consumption
During color BJ head replacement	0.3g
First-time power on after AC power cord connection	0.3g
Power on after 72 hours since last cleaning (also after the first 24 hours as for the initial cleaning)	0.3g
During ink cartridge replacement	0.6g
When left at cartridge replacement position for over 10 minutes	0.6g
When at the cartridge replacement position and the printer is turned off	0.6g
When the dot count exceeds the specified count	0.6g
Button messed for cleaning	0.3g

3.3.2 Purge unit structure

1) Purge drive gear

Through a transmission gear, the purge drive gear is driven by the feed roller which is driven by the paper feed motor. The purge drive gear in turn drives the cam which controls the pump's operation.

The cam's position is detected by the home position sensor via the sensor arm.

2) Wiper unit

When the carriage moves from left to right, the wiper retracts so that it does not touch the head. However, when the carriage moves from right to left, the wiper wipes ink from the BJ cartridge's face plate at the following times:

When the printer is turned on and off, once every 60 seconds [or when the specified dot count is reached) during printing, when the paper pick-up operation ends, when the recovery operation ends, and when the cap is opened or closed.

3) capping unit

The capping unit has a rubber cap. When the carriage moves to the home position, the cap is pressed against the print head's face plate.

Also, since the cap is connected to a pump, the cap sucks ink from the BJ cartridge during the cleaning operation. The ink which has been sucked out is sent to the base cover unit's waste ink absorber.

4) Maintenance jet receiving section

The maintenance jet receiving section takes in ink (for test ejection to maintain the nozzles' working condition) ejected from the BJ cartridge. The ink is received with a gear, which is rotated, sending the ink to the waste ink absorber below.

5) Slide lock pin

The slide lock pin moves the cap when the carriage moves from left to right and reaches the capping position after moving from left to right. Capping is executed while the slide arm is unlocked.

When the slide arm is unlocked, the rotation of the feed roller is transmitted to the purge drive gear and sheet feeder.

6) Ink shield

The ink shield stops any the ink splattered when the wiper unit wipes off ink.

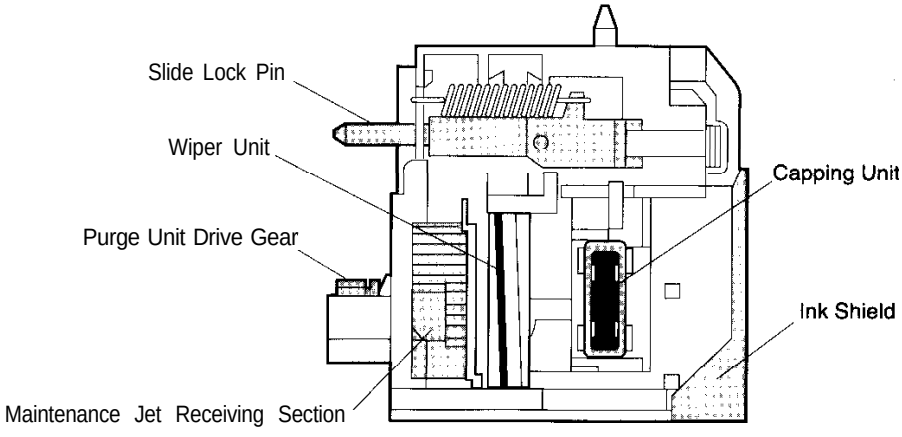


Figure 4-21 Purge Unit

3.4 Carriage

3.4.1 Carriage functions

1) Print head installation

BJ cartridges are attached mechanically and connected with electronic circuitry to the carriage.

2) Carriage **driver**

Driven by the carriage motor and carriage belt, the carriage moves across the paper horizontally.

3) Paper thickness adjustment

The paper thickness lever on top of the carriage, adjusts the gap between the paper and print head.

4) Paper feed motor driver

When the carriage moves to the cleaning position at the right end of the platen the slide arm is unlocked. The paper feed motor's drive power, normally used for paper feeding during printing, can be diverted to drive the purge unit and sheet feeder.

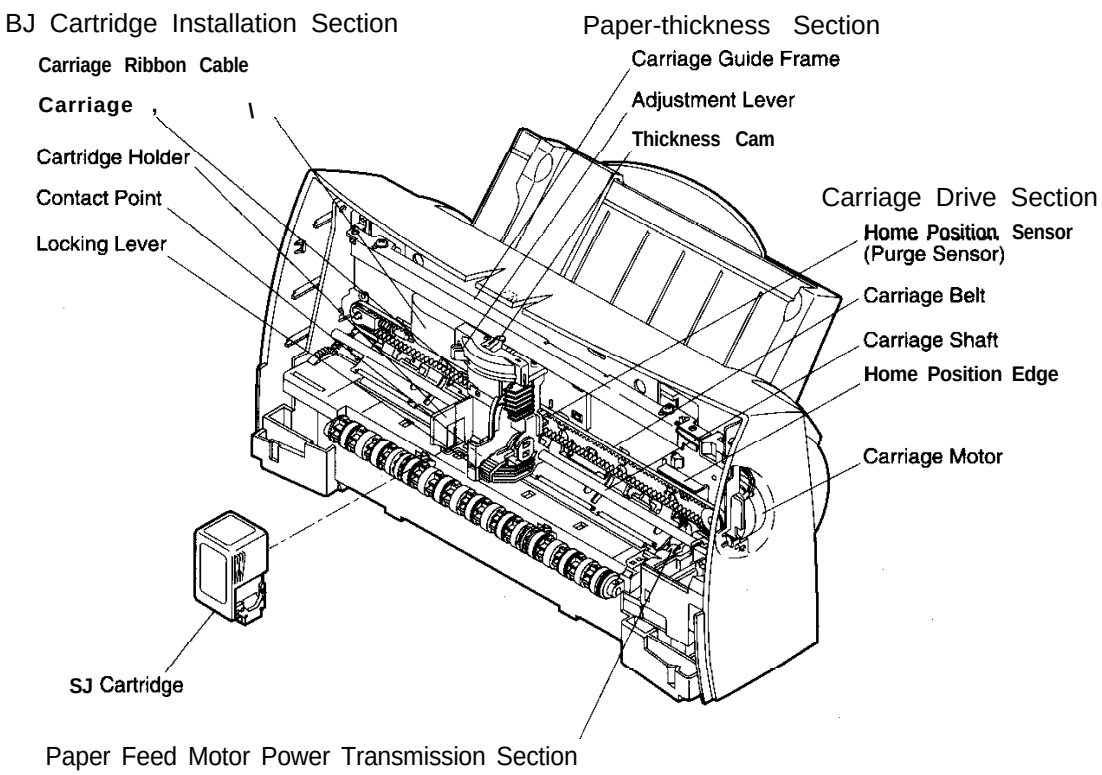


Figure 4-22 Carriage

3.4.2 Carriage structure

1) BJ cartridge attachment section

The cartridge holder moves with the locking lever which secures the BJ cartridge into the carriage.

When a BJ cartridge is secured into the carriage, the ribbon cable signal contacts are pressed against the bubble jet head signal contacts, enabling signals to be transmitted from the logic board.

2) **Carriage driver**

The stepping-type carriage motor drives the carriage horizontally across the paper with the carriage belt. After the photo interrupter's home position sensor behind the carriage detects the home position edge as the initial position, the carriage is controlled by the stepping pulse sent to the carriage motor.

The carriage motor is driven by a one to two-phase exciter at a fixed current.

A mechanical shift occurs during the bidirectional non-continuous printing in the paper feed direction. After the bidirectional carriage shift for each mode, the slightly-off timing of the detected home position edge is adjusted automatically by delaying the ejection of ink. The slightly-off timing of the detected home position edge is adjusted with software and thereby corrected automatically. During the initial operation, HQ mode is corrected. For the other modes, the misalignment is measured and corrected before printing starts.

3) **Paper thickness setting**

If envelopes or thick paper is fed for printing, they will rub against the head face causing possible damage and paper contamination. This can be prevented by making the proper paper thickness setting.

The gap between the head and paper must be set to the optimum setting (one of three settings) to match the thickness of paper being fed. This gap is adjusted by changing the angle of the carriage guide frame and the carriage attachment angle. The gap between the platen and head thereby changes.

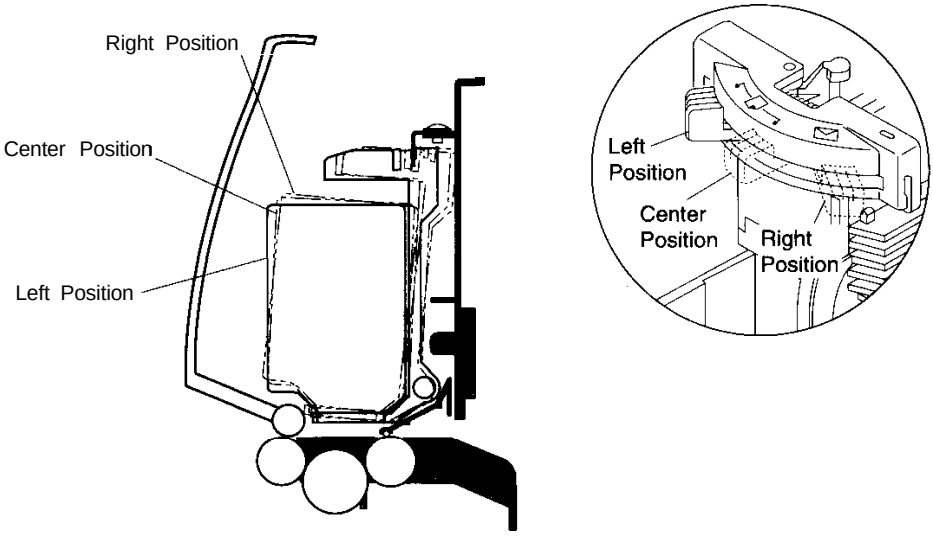


Figure 4-23 Paper Thickness Adjustment

4) **Switching the paper feed motor drive transmission**

The paper feed motor drives either the paper feed, purge unit or cut sheet feeder according to the position of the carriage. When the carriage is not at the right end, the slide arm is locked by the purge unit's slide lock pin. In this condition, paper feed is driven by the feed roller. When the carriage is at the capping position, the slide arm is unlocked and the paper feed motor drives the purge unit and sheet feeder.

When the slide arm is unlocked and the feed roller is rotated in the feeding direction. the slide arm rotates until it reaches the sheet feeder gear to drive the gear.

When the slide arm is unlocked and the feed roller is rotated in the opposite direction of the feeding direction, the slide arm rotates until it reaches the purge drive gear to drive the gear.

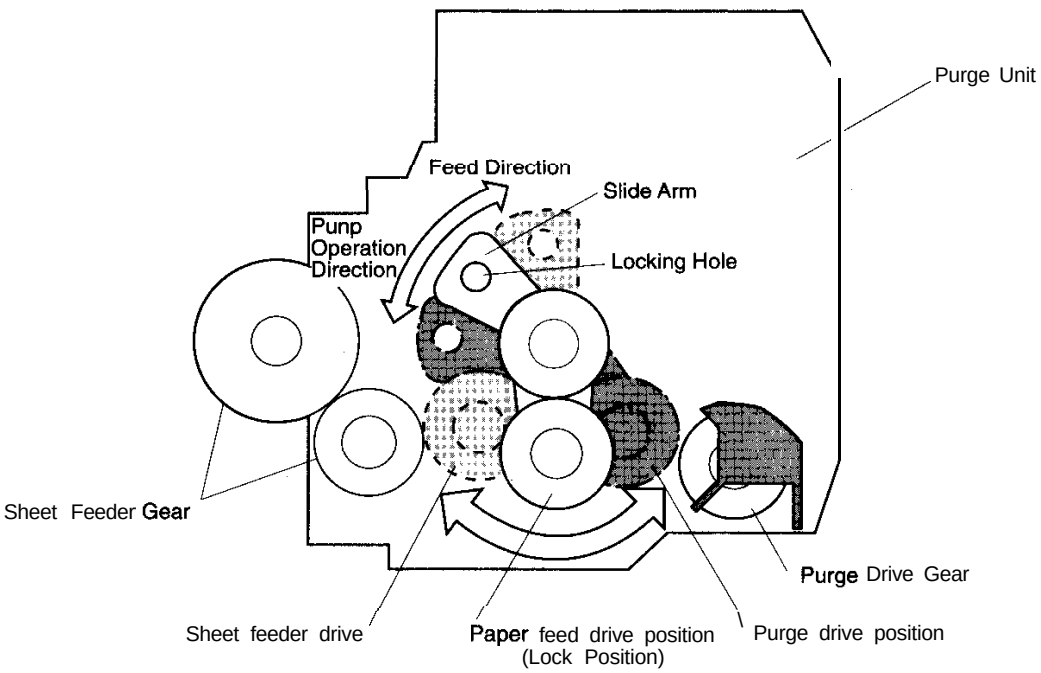
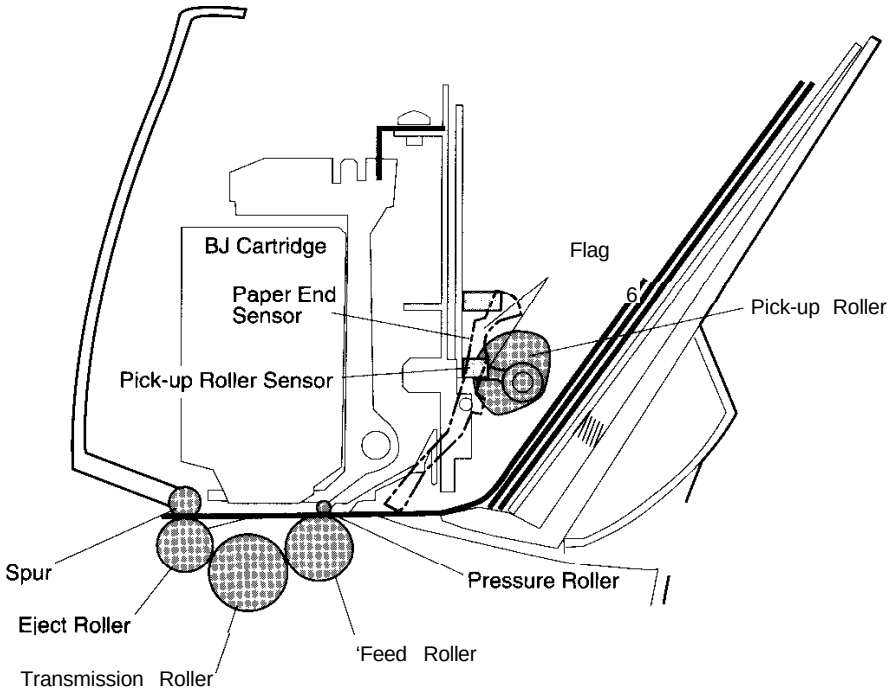


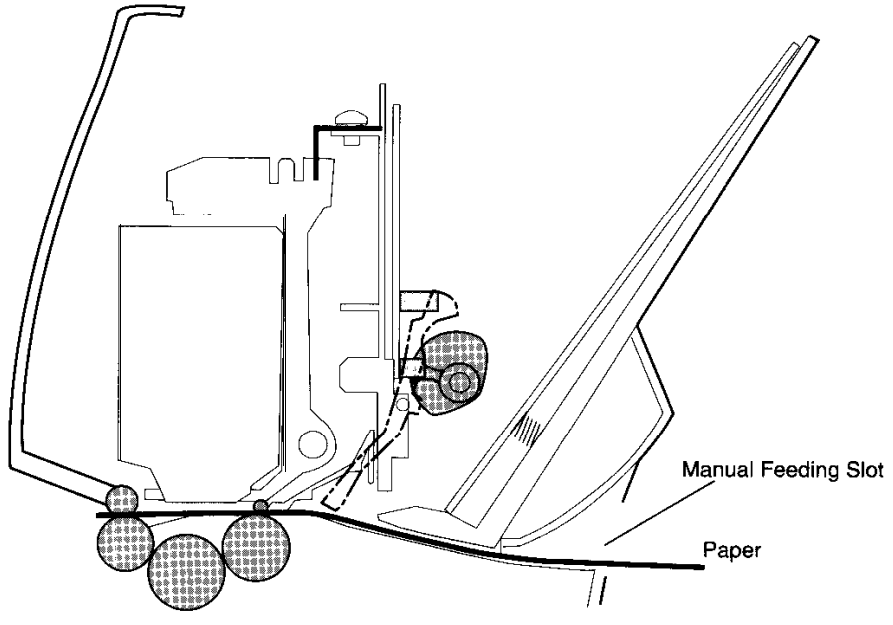
Figure 4-24 Paper Feed Motor Drive Transmission

3.5 Paper Feed

3.5.1 Outline of the paper feed



<Paper path from the cut sheet feeder>



<Paper path from the manual feeding slot>

Figure 4-25 Paper Feed Mechanism

1) Paper feed mechanism

The paper feed mechanism can supply paper in two ways. automatically from the cut sheet feeder and manually from the manual feeding slot.

The built-in cut sheet feeder is driven by the paper feed motor. Paper stacked in the sheet feeder is picked up and fed automatically. Even thick paper like envelopes can be fed automatically without selecting the paper type mechanically with the paper selection lever.

When paper is loaded in both the cut sheet feeder and manual feeding slot, priority is given to the manual feeding slot.

When the paper is sensed by the paper end sensor, it is fed automatically by the paper feed roller until it reaches the starting position for printing on the platen. During printing, the paper is fed by the rotation speed of the paper feed roller.

The paper after printing is delivered out by the eject roller.

2) **Paper feed operation**

Paper feed operations are executed by the RESUME button. When the RESUME **button is** pressed until the beeper sounds once, the paper is fed automatically from the sheet feeder if it is not at the starting position. If the paper is already at the starting position, it is delivered out.

3.5.2 Auto feedlfvlanual feed

This printer has no paper selection lever on the cut sheet feeder.
If the paper meets specifications, it can be fed without selecting operation the paper type. The paper is loaded in the cut sheet feeder such that a corner of it is caught by the paper separator. When printing starts, the pick-up roller starts to rotate through the drive of the paper feed motor. Plain paper is fed with its corner held by the paper separator, and then pushed into the paper feed section. When printing on thick paper like envelopes, as the paper is stiffer than the return force of the paper separator's spring. the paper separator is pressed down to feed the paper.

Initial position of the pick-up roller is detected when the flag is sensed by the pick-up roller sensor on the logic board.
When the paper is sensed by the paper end sensor for over a second, it is fed automatically until it reaches the starting position for printing.
If the paper is not sensed even when the paper pick-up operation is executed, it is executed again. If the paper is still not sensed. it is assessed as a paper feed error.
When manual feeding, set the paper in the manual feeding slot until it reaches the position where the paper end sensor detects the paper.
Paper pushed into the paper feed section is fed to the starting position for printing after it has been sensed by the paper sensor for over a second.
At this time, the paper passes through a different paper path from that of the cut sheet feeder. This makes it possible to give priority to manually fed paper. even when paper is loaded in the cut sheet feeder.

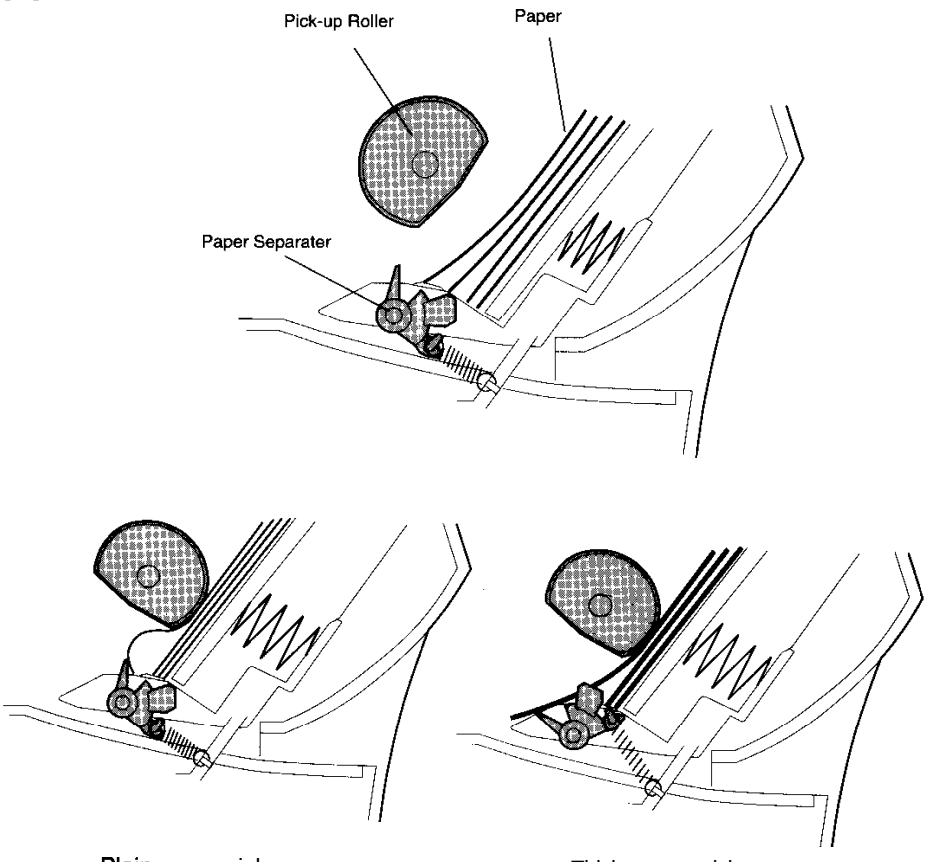


Figure 4-26 Paper Pick-up Mechanism

4. PRINTER ELECTRICAL SYSTEM

4.1 Overview

The electrical system functions are handled by the logic section or power supply. The logic section converts the data from the interface into print signals or printer operation signals and drives the BJ cartridge and motors while monitoring the status of the sensors.

The power supply unit consists of a built in AC adapter which provides DC output to the logic board, motors and head etc.When DC input power from the AC adapter is being supplied. all of the hardware components are active except for the following which are inactive: All buttons except the POWER button, and the photo interrupter's sensor.

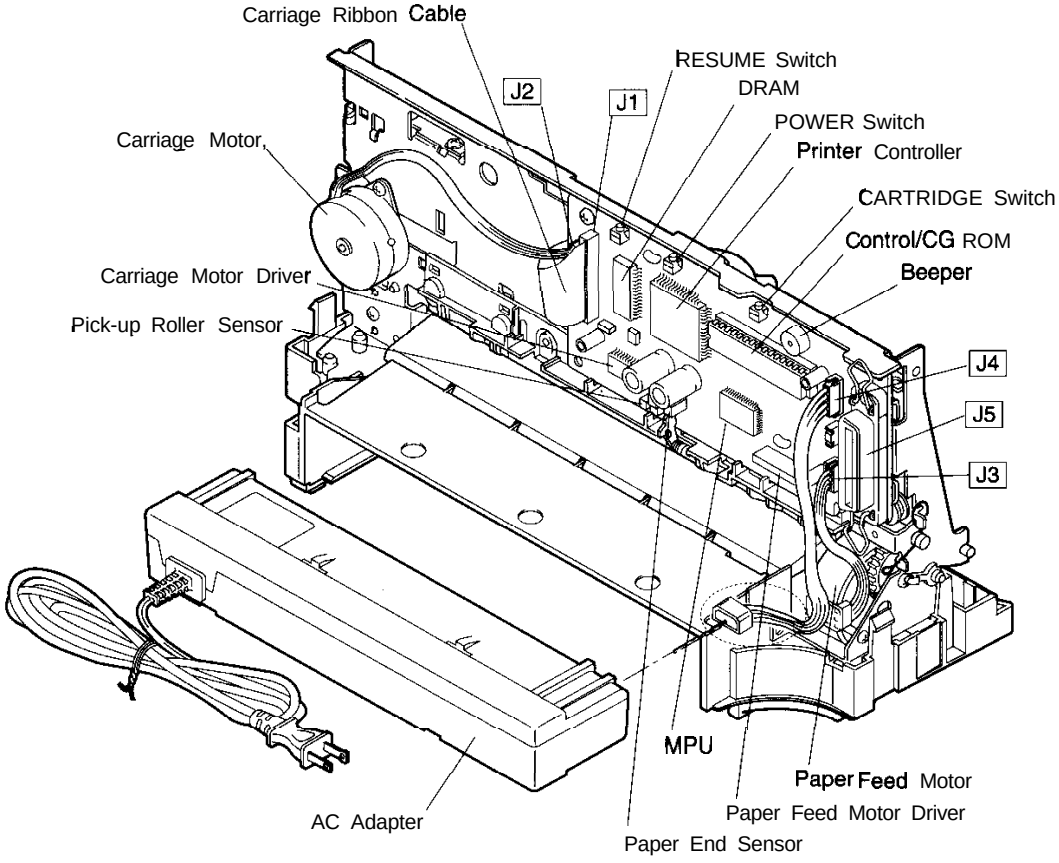


Figure 4-27 Printer Electrical System

4.2 Logic Section

4.2.1 Logic section block diagram

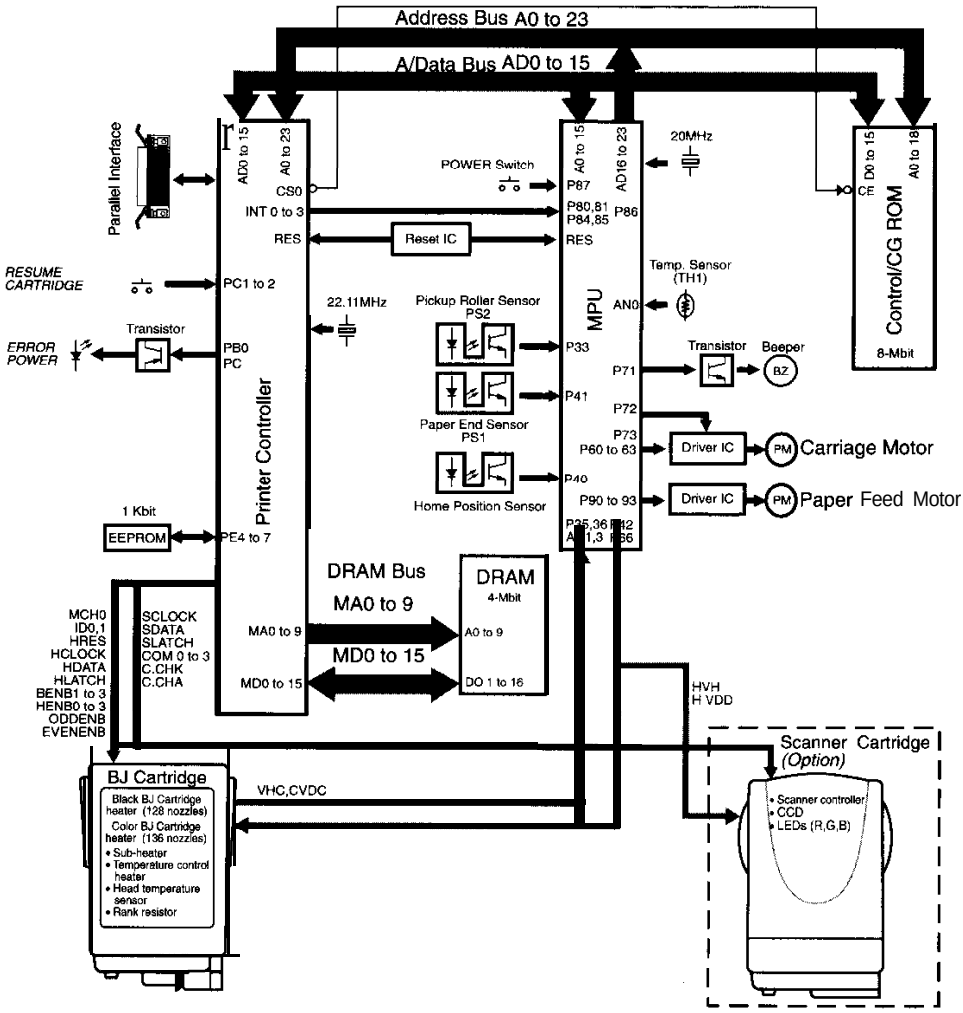


Figure 4-28 Logic Board Block Diagram

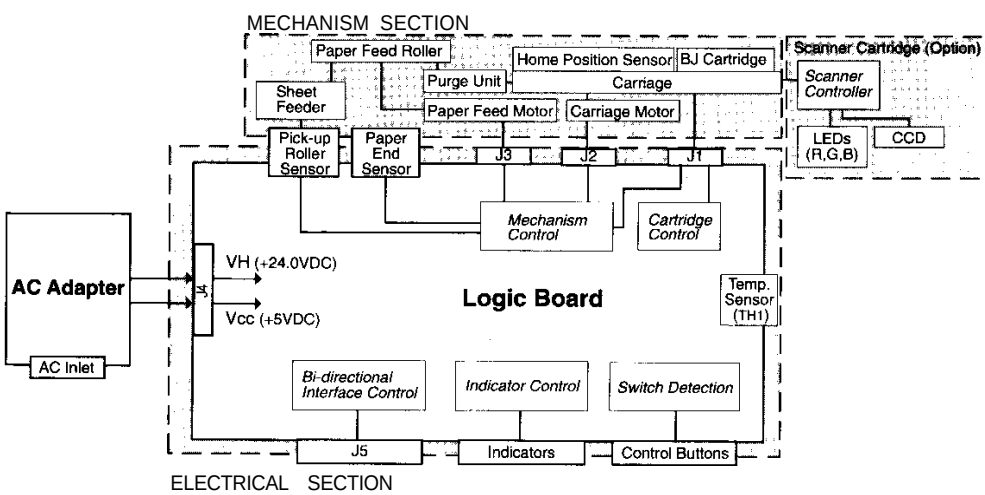


Figure 4-29 Printer Block Diagram

4.2.2 Logic section components

1) MPU (IC1)

The MPU contains a 16-bit CPU, 1K-bit RAM, 24-bit address bus port, 16-bit data bus port, stepping motor controller, interrupter controller, A-D converter, I/O ports. and other components.

Built-in CPU

The 16-bit CPU operates in synchronization with a 20 MHz external clock input.

Address bus

The 24-bit address bus port is connected to an 8 M-bit control/CG ROM and printer controller. The controller/CG ROM synchronizes with the read signals output by the MPU and the 20 MHz clock signal. The printer controller then selects the chip.

Data bus

Like the address bus, the 16-bit data bus port is connected to the 8 M-bit control/CG ROM and printer controller.

Stepping motor controller

The stepping motor controller outputs the carriage motor single- and two-phase exciter drive signals and paper feed motor two-phase drive signals.
The stepping motor controller switches the carriage motor with the B-step peak current value for optimum drive. The stepping motor controller outputs the switching control signal to the carriage motor driver.

Interrupt controller

For external interruption, the MPU has ports P80, 8 1, 84, 85, and 87 to receive the POWER button on/off switching, data reception, initial interrupt request. receive buffer-full warning. and other signals. The MPU executes interrupt processing for the respective signals.

A-D converter

The following analog signals are detected after they pass through the built-in A-D converter:
AN0: The printer's internal temperature is detected by the thermistor on the logic board.
AN 1: The head temperature is detected by the head temperature sensor in the BJ cartridge.
AN3: The head rank is detected by the rank resistor in the BJ cartridge.

I/O port

The setting status determined by the head ID, paper end sensor, home position sensor. and pick-up roller sensor are input through the input ports. The buzzer, BJ cartridge detection, head-driving voltage control, and other signals are output from the output ports.

2) Printer controller (IC5)

The printer controller contains the interface controller, print head controller, buffer controller, DRAM controller, EEPROM controller, I/O ports, etc. It operates in synchronization with an external 22.11 MHz external clock input.

Interface controller

The interface controller receives from the computer, 8-bit parallel data which is synchronized with the data strobe pulse (STROBE) through the BUSY/ACKNLG handshake. It also controls other interface signals.

The data received through the interface is stored in the DRAM's receive buffer and analyzed by the MPU.

When the printer initialization signal INIT is input through the interface to the printer controller, the printer controller outputs a BUSY signal. Also, after INT1 is output to the MPU and print data in the print buffer is printed, the printer is initialized.

DRAM controller

The DRAM controller is a DRAM-specific bus separated from the MPU bus. It controls the 4 M bit DRAM's 10-bit address/ 16-bit data bus and also executes read/write control, RAS/CAS control, and refresh control.

Buffer controller

The buffer controller automatically writes the received data to the receive buffer on the DRAM, manages the receive buffer's remaining capacity, automatically reads the print buffer, and clears the data after it is read.

Print bead controller

The print head controller converts the print data read from the DRAM's print buffer from parallel to serial and sends it to the print head. At the same time, the printed dots are counted for the variable control of the Heat-enable (H ENB) signal pulse width.

The head-driving signals consist of the block enable signals (B ENB 1, 2, 3), odd/even enable signals (OddENB/EvenENB), and heat enable signals (H ENB 0, 1, 2, 3). The block enable signals and odd/even enable signals specify the block for time-shared drive. The heat enable signals control the eject heater's conduction time.

I/O port

The I/O ports sense the *RESUME* and *CARTRIDGE* buttons' input status. The output ports control the lighting of the *POWER* and *ERROR* indicators.

3) Control/CG ROM (IC3)

The 8 M-bit control/CG ROM contains the program and bitmap font data for printer control.

4) DRAM (IC4)

Controlled by the printer controller, the 4 M-bit DRAM is used as a receive buffer, download buffer, print buffer, and working area.

5) Reset IC (IC7)

This IC detects the power voltage when turning on the power or instantaneous power failure.

6) EEPROM (IC8)

Controlled by the printer controller, the 1 K-bit EEPROM (Electrically Erasable and Programmable ROM) stores various function settings, the total count of printed sheets, and the total waste ink amount.

7) Paper feed motor driver (IC6)

Controlled by the MPU, the paper feed motor driver drives the paper feed motor (controlled by the two-phase exciter) with a constant-voltage unipolar drive. The driving IC has four same circuits.

8) carriage motor driver (IC12)

Controlled by the MPU, the carriage motor driver drives the carriage motor (controlled by the one to two-phase exciter) with a fixed current bipolar drive. In accordance with the switching signal from the MPU, the peak current value is set to five steps and driven.

The driving IC has two of the same circuits

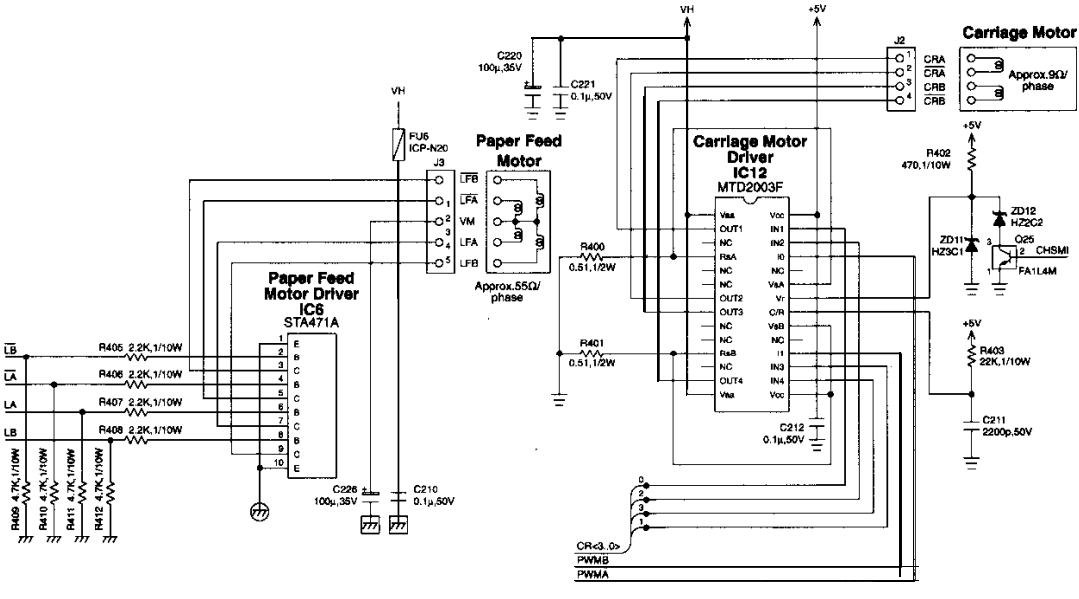


Figure 4-30 Motor-Driving Circuit

5.5 Head Temperature Sensor

The head temperature sensor in the print head is a diode sensor which detects the head's internal temperature. Temperature changes in the head are detected by the MPU as voltage-level changes.

The analog value input to the MPU is converted into a digital value by the A-D converter. This digital value is used for stopping dot ejection if there is an abnormal temperature increase.

5.6 Waste Ink Amount Detection

Waste ink is discharged during head maintenance and absorbed by the waste ink absorber.

If the amount of waste ink discharged exceeds the absorption capacity of the waste ink absorber, ink might leak from the printer.

To prevent ink from leaking, the waste ink absorber capacity is estimated and detected when full.

The waste ink is discharged during maintenance jet and cleaning. The amount of waste ink discharged is estimated by counting the number of maintenance jet and cleaning operations. Then the waste ink amount is calculated taking into consideration the amount of evaporated ink. When the calculated waste ink amount exceeds the capacity of the waste ink absorber, a waste ink-full error occurs.

TABLE 4-6 LIST OF SENSOR FUNCTIONS

Sensor Function	Description	Status
Paper detection	Detected by the paper sensor	Provided
Paper width detection		Not provided
Home position detection	Detected by the home position sensor	Provided
Cartridge detection	Detected by the head rank resistance and head temperature sensor	Provided
Ink cartridge detection		Not provided
Cartridge identification	Identified by the head's ID0, ID1 and INKS2	Provided
Waste ink amount detection	Calculated with the maintenance jet dot count	Provided

6. SCANNER CARTRIDGE

6.1 Scanner Cartridge Overview

The scanner cartridge is a replaceable scanner unit that carries a one-line 128 pixel CCD. The scanner separates each of the three RGB primary colors of the LED by scanning the same line three times. The color image is output by S-bit signals, 256 gradation in each RGB primary color. For a monochrome image, the image is lit with a green LED and scanned once to output either a S-bit or 2-bit signal. The maximum scanning resolution is 360 dpi x 360 dpi.

The light source LED within the scanner lights up and illuminates the document on the platen. The light rays hit the image and using an imaging lens the reflected light rays are converged onto the CCD sensors. The converged light rays are converted to analog signals by the CCD. After the analog signals have been converted to digital signals by the scanner controller, the scanned image is processed and the image data is sent to the computer via the printer's bidirectional centronics interface.

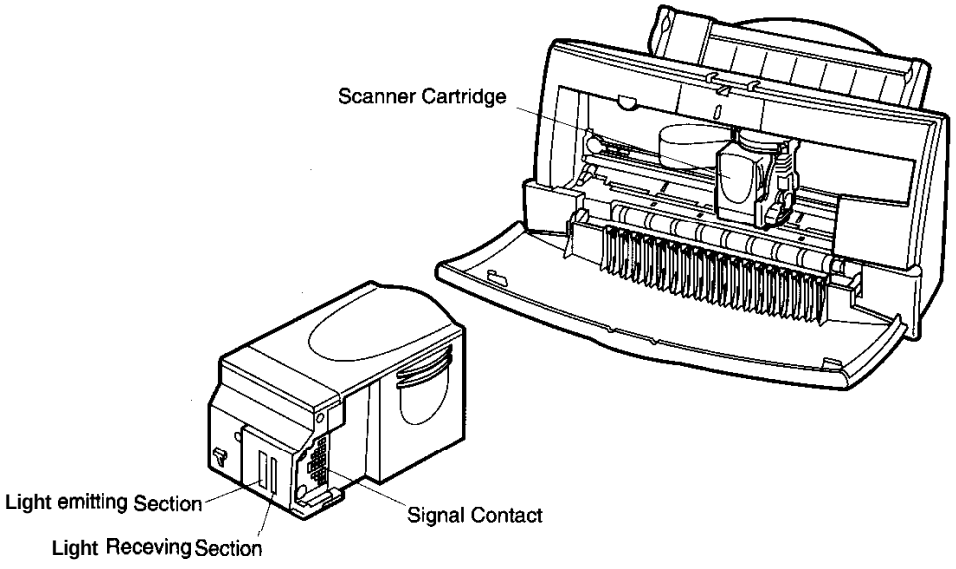


Figure 4-32 Scanner Cartridge

6.1.1 Block Diagram

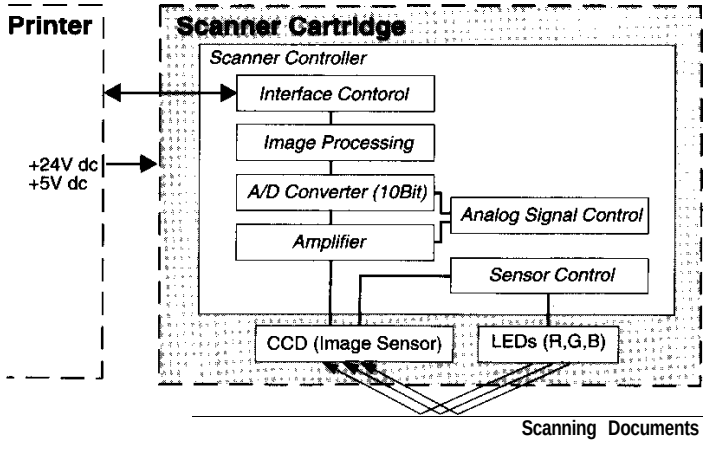


Figure 4-33 Block Diagram

6.2 Scanner Cartridge Structure

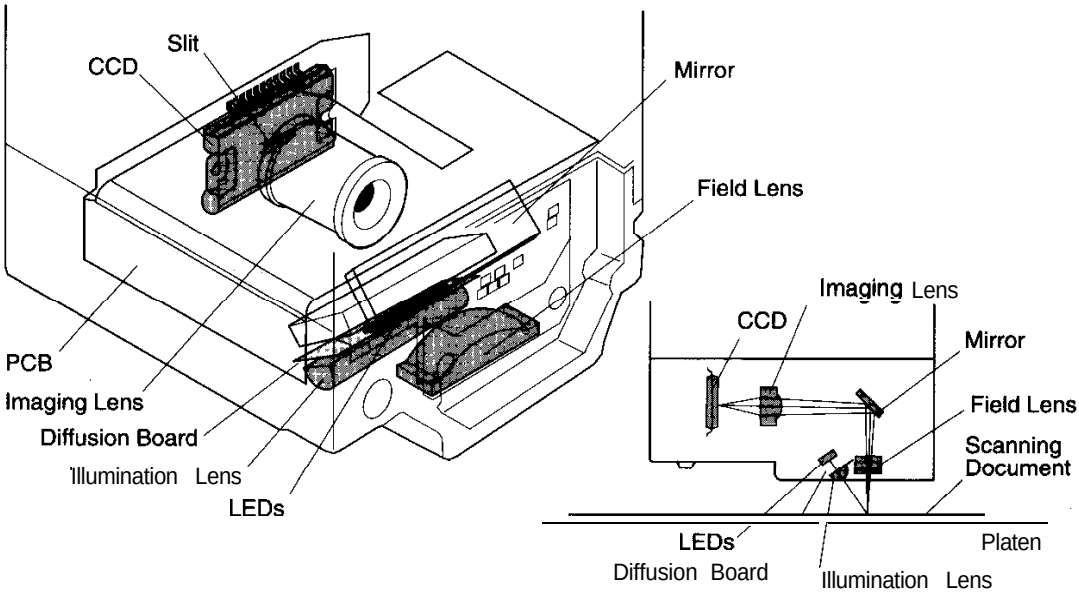


Figure 4-34 Scanner Cartridge

1) LED

Red, green and blue LEDs are used to illuminate the scanning document. To compensate for the low intensity of the red and green LED's, two red and green LEDs have been incorporated and a total of five LEDs are mounted on the scanner. Only the green LED is used for monochrome scanning.

2) Illumination lens

This "D" shaped lens converges the light from the LED light source.

3) Diffusion **board**

The light intensity of the LED is brighter at the center than at the ends. The diffusion board allows even distribution of light onto the document.

4) **Field lens**

This lens prevents any magnification reduction caused by paper gaps when scanning a lifted or bent document.

5) Imaging lens

This lens is used for forming an image of the light rays converged by the **field** lens onto the CCD.

6) Shading board

The shading board with a slit at the front surface of the CCD is used to prevent crosstalk generated in areas adjacent to high contrast areas.

7) CCD

The scanner cartridge uses a semiconductor type, one-line 128 pixel CCD [Charge Coupled Device). Depending on the light amount of the image formed on the CCD. electric voltage signals are sent to the scanner controller as image signals

8) Scanner controller

The scanner controller is an IC that controls the CCD and processes the analog signal output from the CCD. The scanner controller also controls the following image processing:

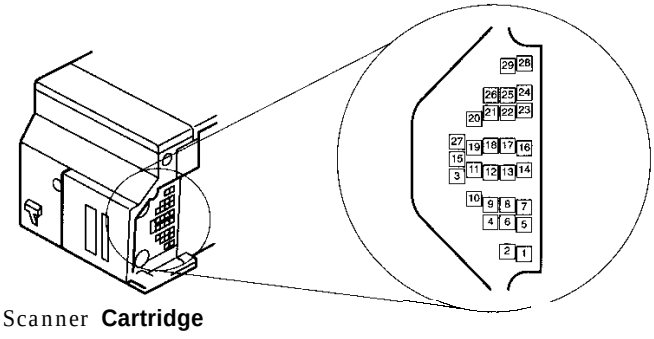
- Black Level Correction
  The black level is set to maximum CCD output.
- A/D Converter
  The A/D converter converts the image signals to 10 bits image data.
- Shading Correction
  The variation of the image signal is corrected by the shading correction. Due to (i) the variation of the sensitivities of the CCD sensor elements and (ii) the uneven distribution of light transmitted through the center and the periphery of the lenses, the intensity of each scanned line is not uniform. The scanned data is compared against a standard white data to even out and correct the density.
- Carriage Scanning Direction Resolution Converter
  The carriage scanning direction resolution converter converts the resolution of the output in the scanning direction according to the carriage direction.
- Edge emphasis
- Binary image processing function

The scanner controller has a built-in SRAM used for output buffer memory.

Scanner cartridge cannot be disassembled, reassembled.
As the imaging lens is used for forming an image on the CCD, it is moved from its fixed position to adjust the optical path for focusing. Focusing cannot be conducted during servicing.

6.3 Signal Contacts

The scanner cartridge is recognized by TOP.S, DIAS and CCHK signals. The scanned image output to the printer is transmitted with a SCLOCK signal in sync with a SDATA signal. The scanner is controlled by the internal register setting signals, CMDO, 1, 2 and 3.



Scanner Cartridge

Figure 4-35 Contact Pad Layout

TABLE 4-7 LIST OF SCANNER CARTRIDGE SIGNAL CONTACTS

NO.	Signal	Type	Description	[Ref. BJ Cartridge)
1, 2	LAMPG		GND for LED	VHG
5, 6	V LAMP		LED drive voltage (+24Vdc)	HVH
9	TOP. S	OUT	Scanner detection GND	TOP
10	DIA. S		Scanner detection OPEN	DIODEA
11	ID0	IN	Not used	ID0
12	ID1	IN	Not used	ID1
14	vss	GND	GND	HVSS
19	COM 0 (REN)	IN	Register enable	Odd ENB
20	COM 1 (RWR)	IN	Register write clock signal	BENB 1
21	COM 2 (RDT)	IN	Register data signal	BENB2
22	COM 3 (N.C)		Not used	BENB3
23	Vdd		IC driver voltage (+5 Vdc)	HVdd
24	S C L O C K	OUT	Scan data transfer signal	HCLK
25	S SYNE	IN	Line start signal	HLATCH
26	S RES	OUT	System reset signal	HRES
28	S DATA	OUT	Scan data	HDATA
29	C. CHK	OUT	HScanner detection OPEN	DIODEK

6.4 Scan Mode

TABLE 4-8 LIST OF SCAN MODE

Scanning resolution	Scanning image Pixel Width			Carriage Speed
	Color	Black & White		
	Multi Value	Multi Value	Binary	
360 x 360	48	48	128	4.08 KHz
300 x 360	48	48	128	5.2 KHz
200 x 360	64	112	128	5.2 KHz
200 x 180	64	128	128	5.2 KHz
180 x 180	64	128	128	6.5 KHz
90 x 90	64	128	128	9.19 KHz

6.5 Calibration

The process of sampling and collecting data such as the printer's internal temperature, black level and white standard data is referred to as calibration.

The scanner application retains the past 5 calibration data and saves them in a file. When a scanning operation is performed, a value from the compiled temperature data that is within ±5°C of the printer's internal temperature at the time is downloaded to the scanner controller. The scanner application requests calibration when there is no compiled data within ±5°C.

1 MAINTENA

1.1 Parts for Regular Replacement

Level	Part
User	None
Service personnel	None

1.2 Consumables

Level	Consumable
User	Black BJ cartridge
	Color BJ cartridge
	Color ink cartridge/ Black ink cartridge
	Photo BJ cartridge
Service personnel	None

1.3 Periodic Maintenance

Level	Periodic Maintenance
User	None
service personnel	None

2. SERVICING TOOLS

2.1 List of Tools

Ordinary Tool	Use
Phillips screwdriver	For removing screws
Blade screwdriver	For removing plastic parts
Tweezers	For installing and removing coil springs
Multi-meter	For troubleshooting

Special Tool (Parts Number)	Use
Gap gauge 1.2 mm (QY9-0016-000)	For adjusting the head gap
Black BJ cartridge	For adjusting the head gap Note: Do not use the user's black BJ cartridge
Grease FLOIL G3 11S (TKC-0953-000)	Apply to the specified place as shown in Figure 5-1
Grease MOLYKOTE PG-64 1 (CK-0562-000)	Apply to the specified place as shown in Figure 5-1

3. GREASE APPLICATIO

Use the special tool to apply grease at the points shown below.

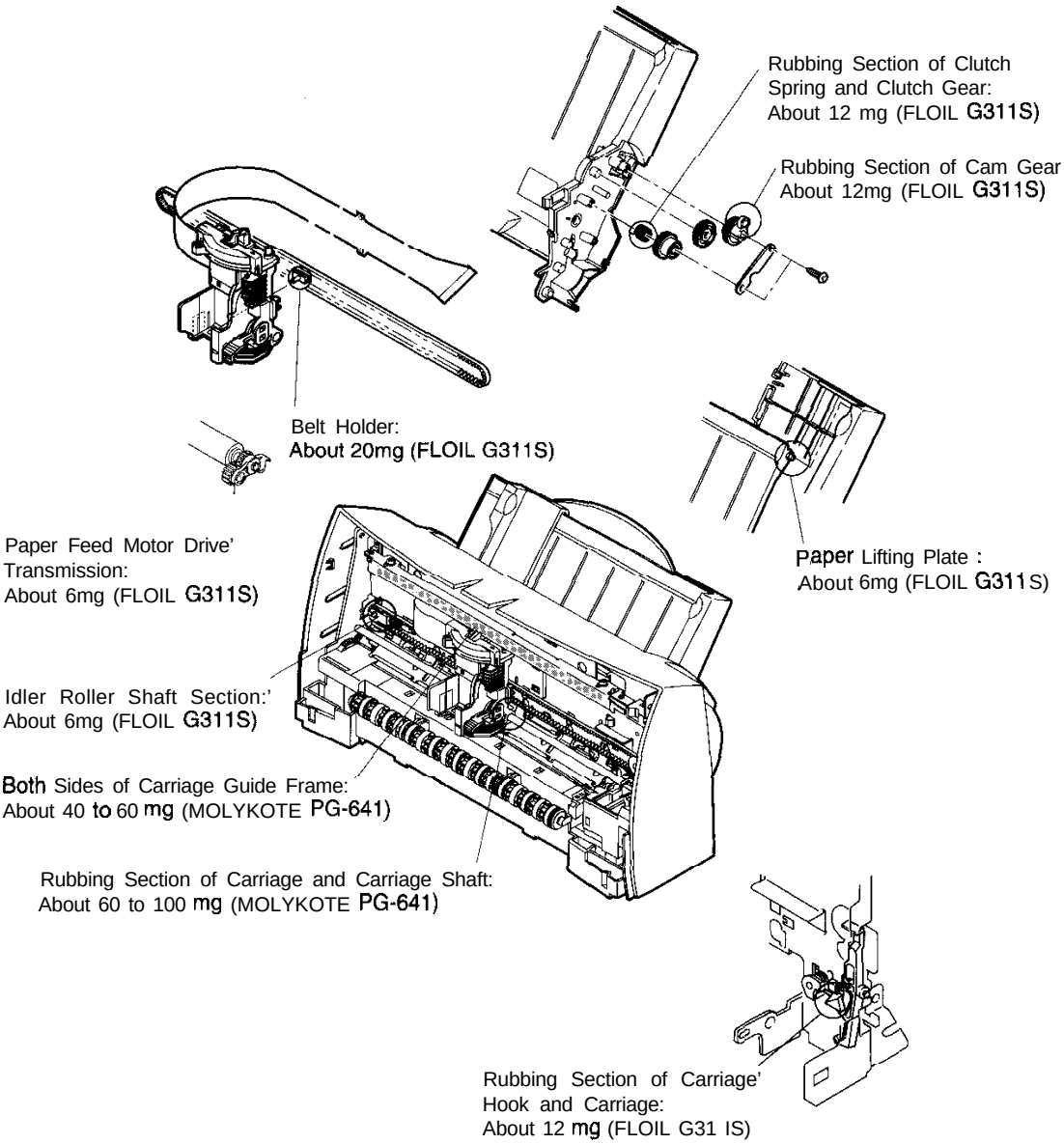

Rubbing Section of Clutch Spring and Clutch Gear: About 12 mg (FLOIL G311S)
Rubbing Section of Cam Gear About 12mg (FLOIL G311S)
Belt Holder: About 20mg (FLOIL G311S)
Paper Feed Motor Drive' Transmission: About 6mg (FLOIL G311S)
Paper Lifting Plate : About 6mg (FLOIL G311S)
Idler Roller Shaft Section:' About 6mg (FLOIL G311S)
Both Sides of Carriage Guide Frame: About 40 to 60 mg (MOLYKOTE PG-641)
Rubbing Section of Carriage and Carriage Shaft: About 60 to 100 mg (MOLYKOTE PG-641)
Rubbing Section of Carriage' Hook and Carriage: About 12 mg (FLOIL G31 IS)

Figure 5-1 Grease Application Points

4. DISASSEMBLY AND REASSEMBLY

4.1 Disassembly and Reassembly

When disassembling or reassembling the printer, refer to the parts catalog. In the parts catalog, figure numbers are in the order of disassembly. Close-up diagrams are also provided for additional detail.

4.2 Disassembly and Reassembly Cautions

When disassembling or reassembling the printer, note the following precautions. These cautions are also provided in the parts catalog.

4.2.1 Waste ink absorber installation

Install the waste ink absorber correctly. If it is folded inward, the waste ink absorption will not be as effective.

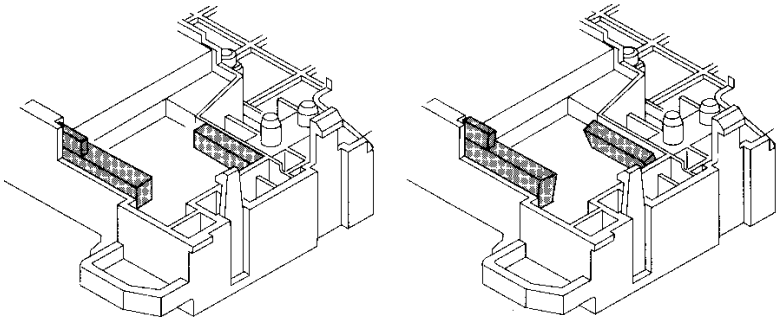


Figure 5-2 Waste Ink Absorber Installation

4.2.2 Carriage guide frame installation

The carriage guide frame adjusts the head gap between the BJ cartridge head face and platen to obtain optimum printing quality. It is mounted on the printer frame.
The head gap must be adjusted only when the carriage guide frame position on the printer frame is altered.
The screws fastening the carriage guide frame are painted red so that they are not loosened during servicing.
If the carriage guide frame must be disassembled, follow the procedure in *"5.ADJUSTMENTS" (page 5-6)* to adjust the head gap.

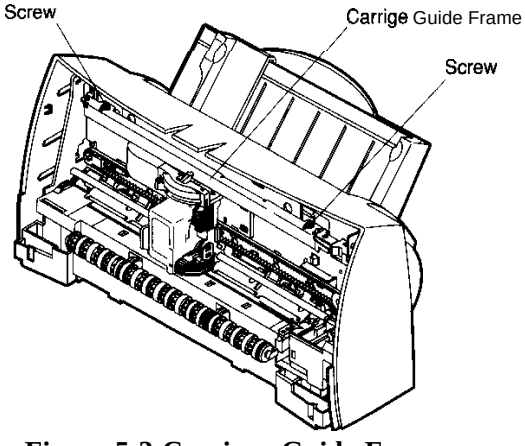


Figure 5-3 Carriage Guide Frame

4.3 Logic Board and Waste Ink Absorber Replacement Cautions

4.3.1 Logic board replacement cautions

The various settings, waste ink amount, and other data stored in the logic board's EEPROM cannot be rewritten into the new EEPROM after the logic board is replaced. The data in the new logic board's EEPROM is not set. After the logic board/EEPROM is replaced, reset the EEPROM as described in "part 3: 3.6 *EEPROM Reset" (page 3-25).*

When replacing the logic board, visually check the amount of waste ink in the waste ink absorber. Replace the waste ink absorber if necessary. Depending on the amount of waste ink already absorbed, ink may leak even before a waste ink-full error warning appears.

The lower waste ink absorber in particular must be replaced. However, it is not necessary to replace it if the printer has been used for less than 2 weeks and less than 50 pages have been printed out.

Replace the upper waste ink absorber only if it has absorbed ink. It is not necessary to replace it if a small amount of waste ink has been absorbed though making contact with the lower waste ink absorber.

NOTE

The waste ink absorption capacity is the total absorption capacity of the upper and lower waste ink absorbers. When the printer is first used, most of the waste ink is absorbed by the lower waste ink absorber.

The amount of waste ink in the upper ink absorber rises as the amount in the lower absorber increases.

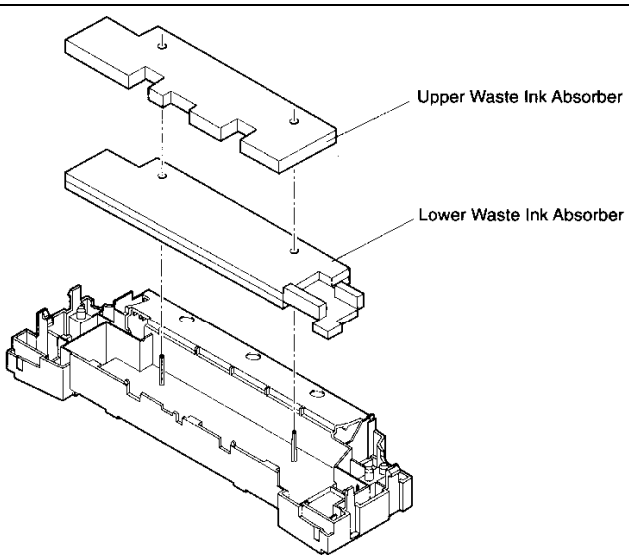


Figure 5-4 Waste Ink Absorbers

4.3.2 Cautions after replacing the waste ink absorber

After a waste ink-full error occurs and the waste ink absorbers are replaced, reset the EEPROM.

NOTE

When a waste ink-full error occurs, it can be assumed that the printer has printed more sheets than its service life called for. However, this depends on how many times the cartridge has been replaced and the usage conditions. When a color BJ cartridge is used, more ink is consumed due to head maintenance compared to a black BJ cartridge. Therefore, the waste ink amount will also be more.

5. ADJUSTMENTS

5.1 Adjustment Point

Only the head gap between the BJ cartridge's head face and platen needs to be adjusted (to approximately 1.2 mm) to ensure optimum print quality.
This adjustment is done by moving the carriage guide frame forward or back.

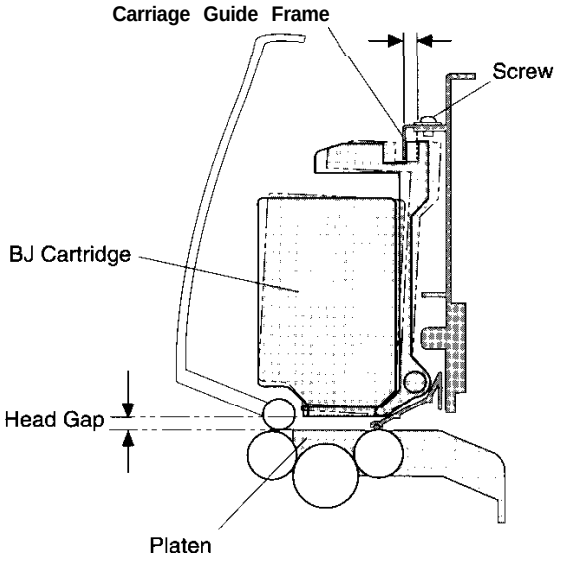


Figure 5-5 Head Gap Adjustment

NOTE

The head gap differs depending on the position of the paper thickness lever.
To adjust the head gap, move the paper thickness lever to the left (for plain paper printing with a black BJ cartridge] and set the head gap to approximately 1.2 mm.

5.2 When Adjustment is Required

If the carriage guide frame fastened to the printer frame is repositioned, the head gap must be adjusted.
The screws are painted red to prevent them from being loosened.

5.2.1 Tools required for adjustment

TABLE 5-l TOOLS REQUIRED FOR HEAD GAP ADJUSTMENT

Tool	Use
Gap gauge 1.2 mm (QY9-0016-000)	For adjusting the head gap
Black BJ cartridge	use as a tool Note: Do not use the user's black BJ cartridge

5.3 Adjustment Procedure

5.3.1 Preparation

1) Remove the upper case unit. (Or assemble the printer until the rear cover is attached.)
21 Install a black BJ cartridge (for servicing) into the carriage.
3) Push in the carriage guide frame as of the arrows and tighten screws A and B lightly.
4) Move the carriage belt with your fingers to move the carriage to position A (center of platen).

CAUTION

Before making the adjustment, make sure the gap gauge is not deformed and no foreign particles are adhering to it and the platen.

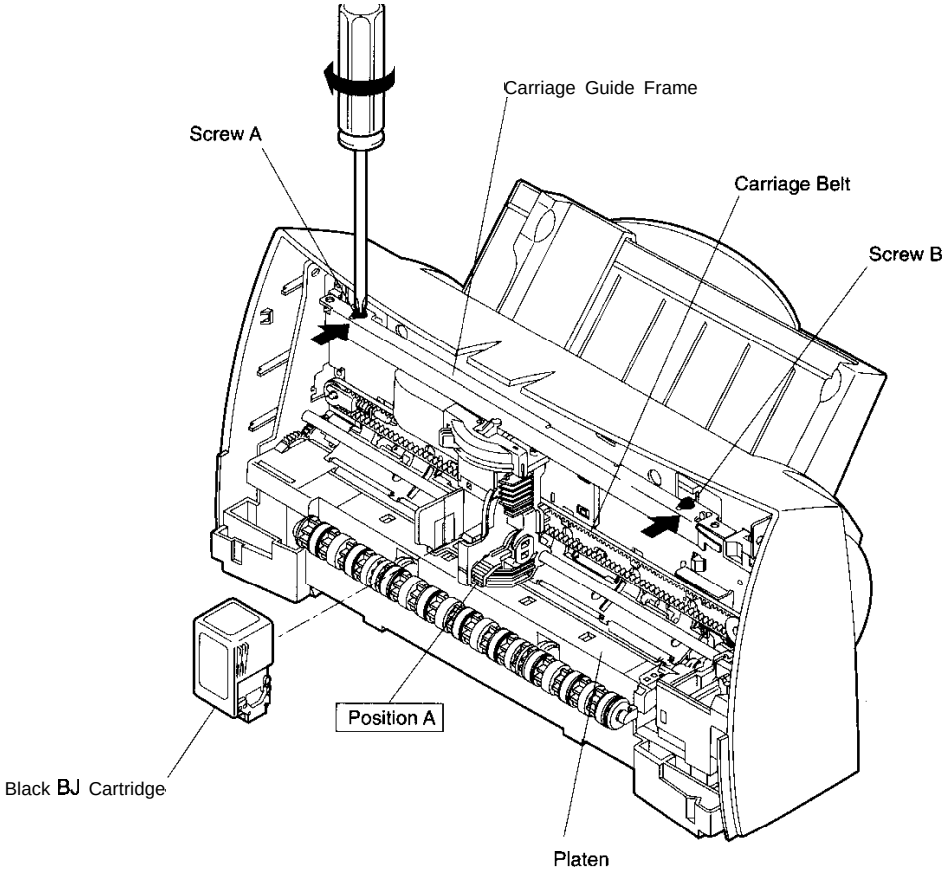


Figure 5-6 Adjustment Preparation

5.3.2 Adiustment

1) Set the paper thickness lever to the right and place the gap gauge at position B.
2) Move the carriage to position B.
31 Set the paper thickness lever to the left.
4) Loosen screw A until the carriage guide frame moves forward under the carriage's own weight with screw B as a pivot.
5) Lightly push the screw A end of the carriage guide frame once or twice and check that the carriage guide frame moves around screw B as shown by the arrows figure 5-8
   If it does not return to the original position, screw B is too tight. And if the screw B end moves as well, then the screw B is too loose. Refasten the carriage guide frame lightly again and repeat the procedure from step ***1).***
6) Lightly tighten screw A.
7) Put the paper thickness lever to the right and move the carriage to position A. Then place the gap gauge at position C.
8) Move the carriage to position C.
9) Put the paper thickness lever to the left.

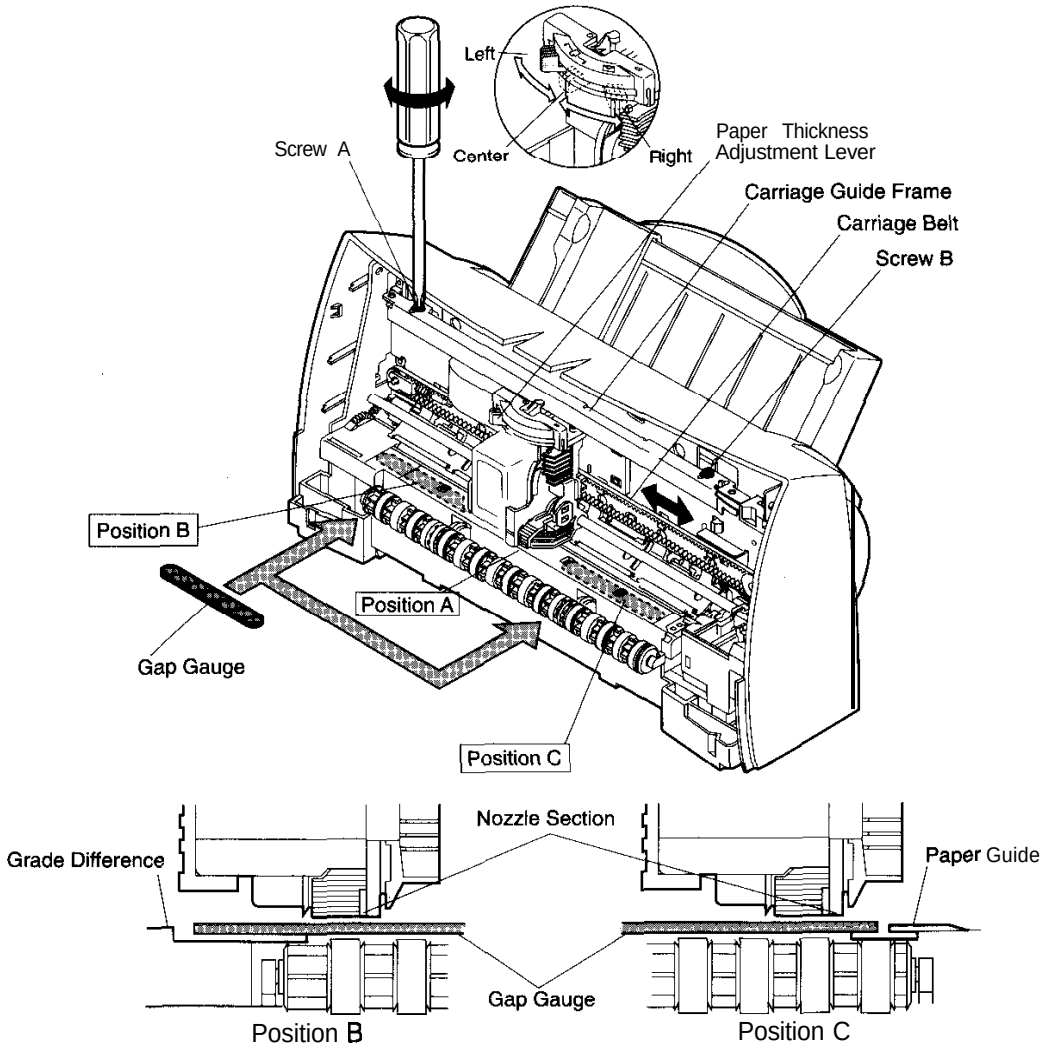


Figure 5-7 Head Gap Adjustment (1)

10) Loosen screw B until the carriage guide frame moves forward under the carriage's own weight around screw A.
11) Lightly push the screw B end of the carriage guide frame once or twice and check that the carriage guide frame moves around screw A as shown by the arrows. If it does not return to its original position, screw A is too tight. And if the screw A moves end as well. then the screw A is too loose. Refasten the carriage guide frame lightly again and repeat the procedure from *step1)*.
12) Lightly tighten screw B.
13) Push the paper thickness lever to the right and move the carriage to position A. Then place the gap gauge at position B.
14) Repeat steps 2) through 13) twice.
15) Alternately tighten screws A and B for final tightening.

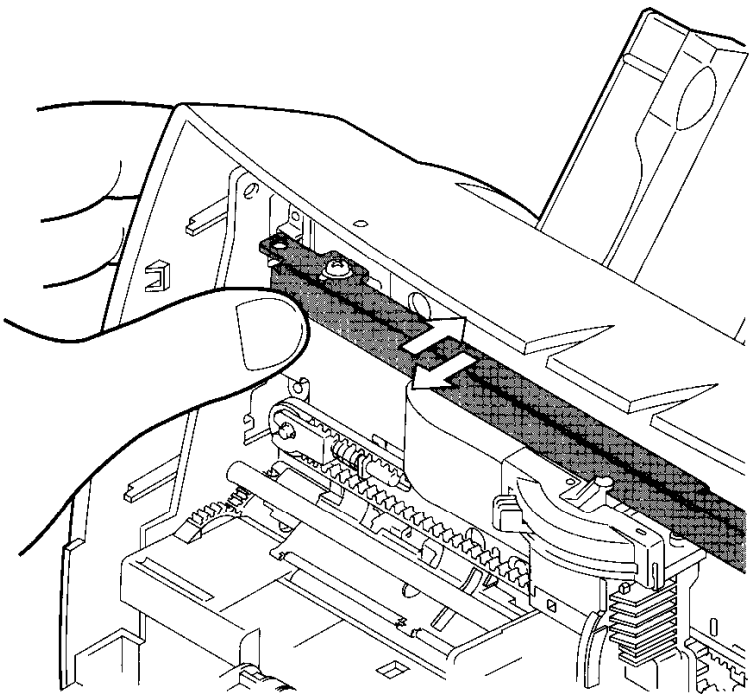


Figure 5-8 Head Gap Adjustment (2)

CAUTION

Do not use your hand to move the carriage. It may cause the carriage guide frame to shift. To move the carriage, use the carriage belt instead. On the platen, there is an elevated step and paper guide. If the gap gauge is placed on either part, an accurate measurement will not be obtained.

6. TROUBLESHOOTING

6.1 Troubleshooting

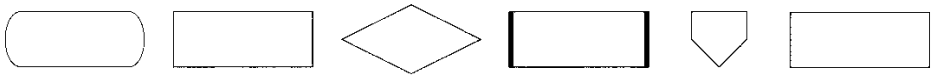
6.1.1 Overview

This chapter consists of the following two sections on subsequent pages: "Error condition diagnosis" for diagnosing the problem when the cause is unknown and "Symptoms" for resolving problems whose cause is known.

If the cause of the problem is unknown, diagnose the problem. And if the cause is known, follow the countermeasures to resolve the problem.

6.1.2 Troubleshooting cautions

1. Before troubleshooting, make sure the connectors and ribbon cable are properly connected. If the problem occurs at random, be sure to check the connections.
2. When servicing the printer with its outer casing removed and the AC adapter connected, beware of electrical shocks and PCB short circuiting.
3. Troubleshooting is described in flowchart form.
   The following symbols are used in the flowcharts.

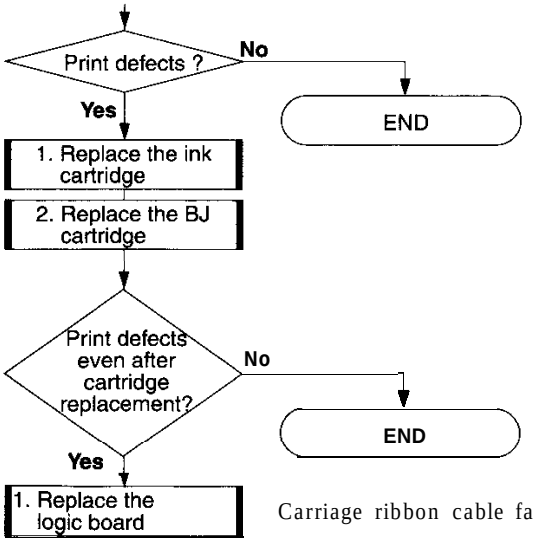


Start/End Procedure Judgement Action/Replace Jump stop

4. If there is a problem with the printing quality or paper feeding, first check that the printer's installation location and paper meet the required specifications. Also check that the paper select lever and the paper thickness lever are set correctly and that the paper is loaded properly.

5. After replacing parts or repairing the printer, be sure to make a test print to confirm that the problem has been fixed.
   If the problem still persists, troubleshoot again while skipping the steps already executed.

Example 1

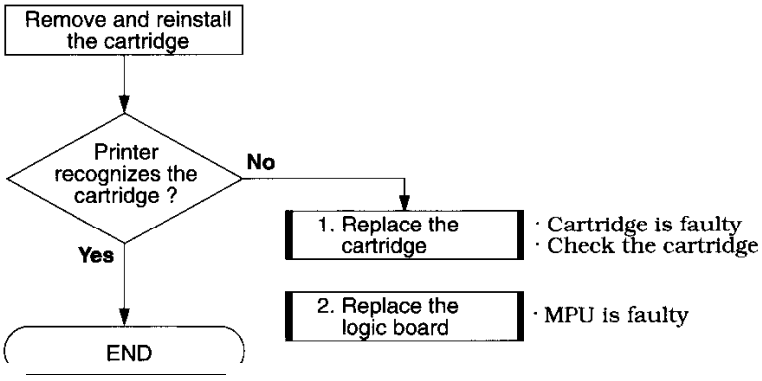


Carriage ribbon cable faulty

6. Some troubleshooting procedures include successive countermeasures. These are steps must be followed to resolve the problem.
   After each countermeasure step, make a test print to confirm whether the problem has been amended. If the problem persists, execute the subsequent countermeasure steps.

Example 2

Countermeasure 1: After replacing the BJ cartridge, execute a test printout to check whether the problem has been fixed.
If the problem persists, execute the next countermeasure step 2 which calls for the replacement of the logic board.



7. Ink cartridge replacement as a countermeasure is only applicable after the color BJ cartridge has been used for the Symptom. When using the black BJ cartridge for troubleshooting, advance to the next step.

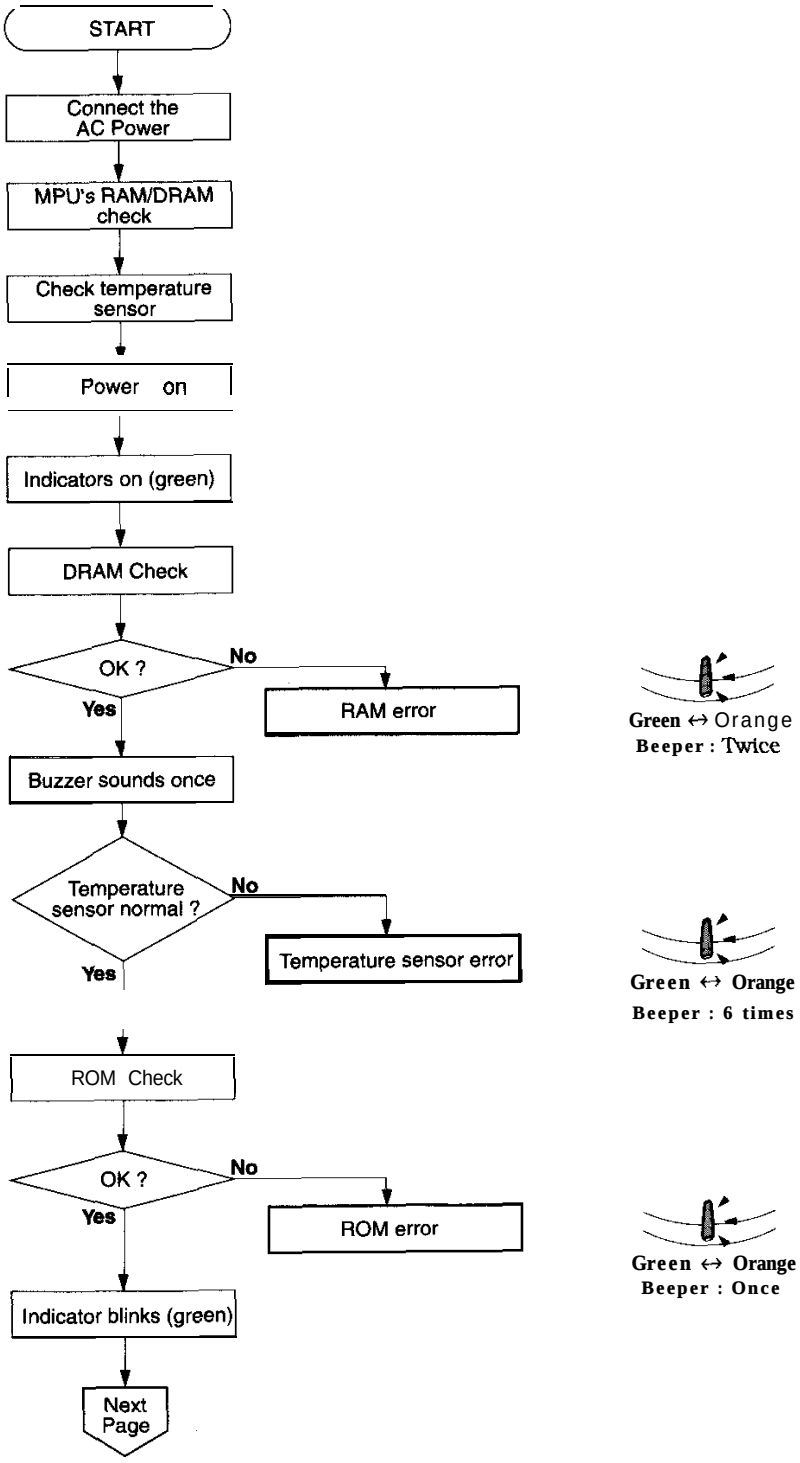
8. After completing the troubleshooting. be sure to reconnect connectors and tighten any loosened screws.

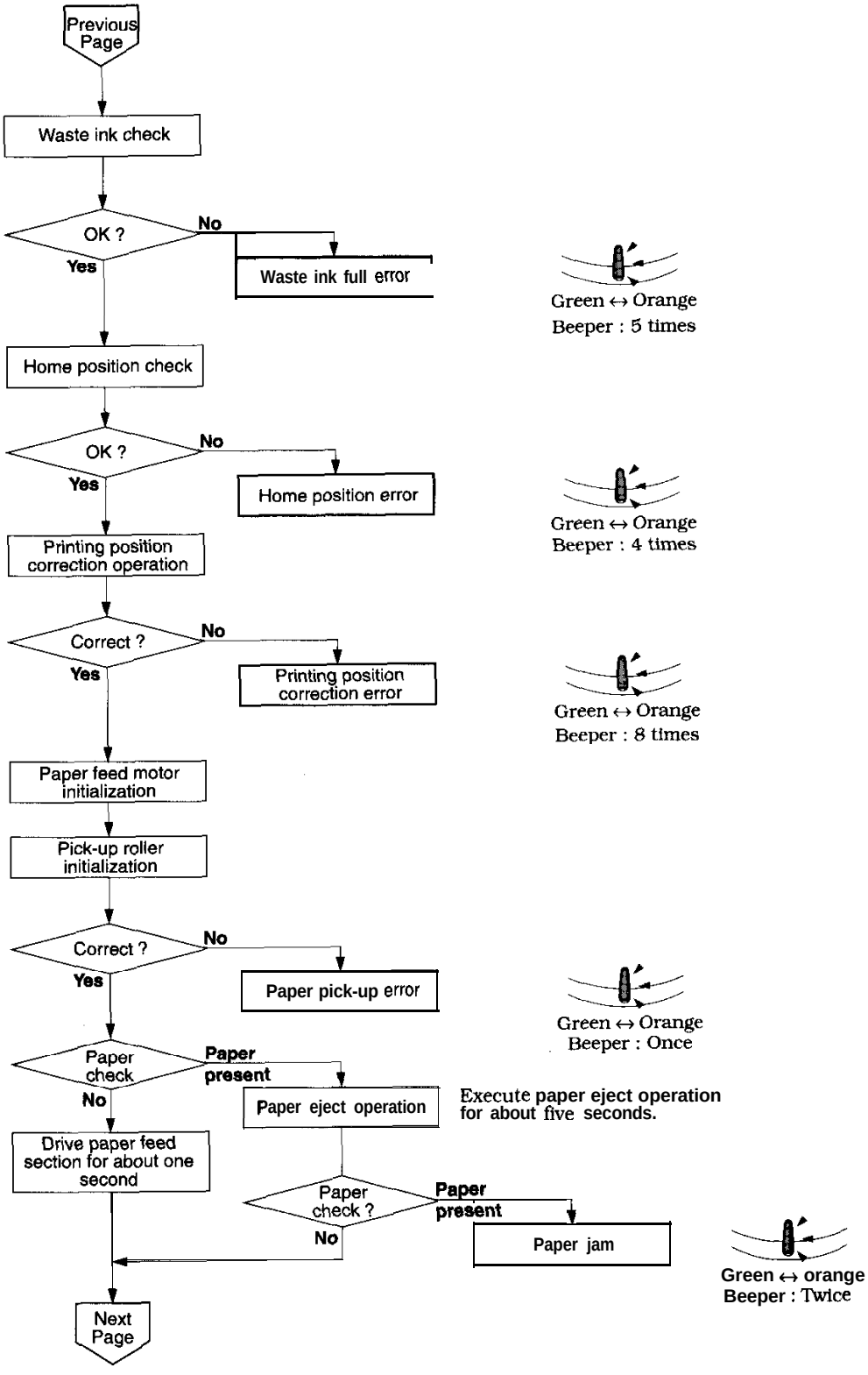
CAUTION

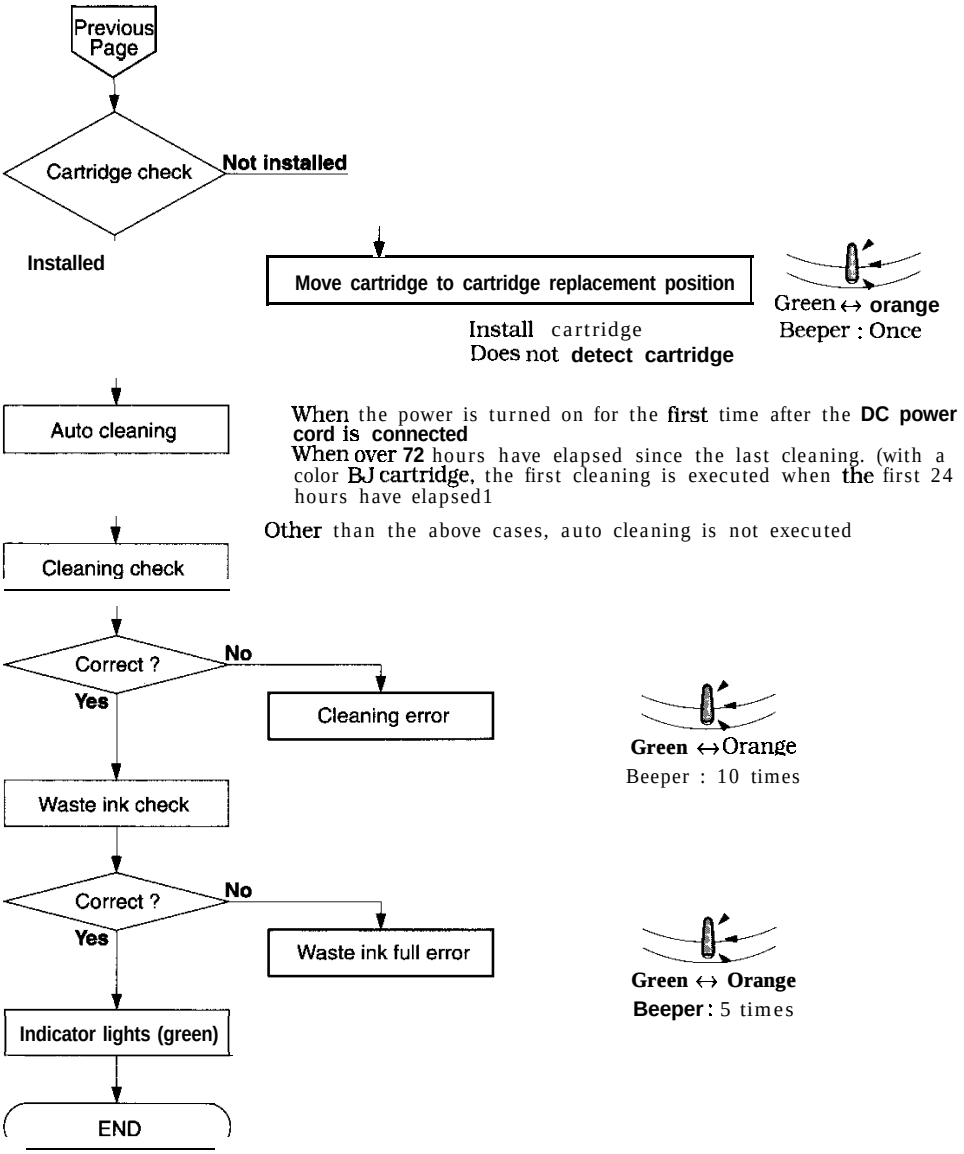
When replacing the logic board, be sure to check the waste ink absorbers' ink amount on the rear of the printer base unit. If necessary, reset the EEPROM.
Refer to *Part* 3, 3.6 *EEPROM Reset (page 3-25)* and *Part* 5, 4.3 *Logic Board and Waste Ink Absorber Replacement Cautions (page 5-5).*

6.2 Error Condition Diagnosis

6.2.1 Initial self check




Previous Page
Waste ink check
OK ?
No
Yes
Waste ink full error
Green ↔ Orange
Beeper : 5 times
Home position check
OK ?
No
Yes
Home position error
Green ↔ Orange
Beeper : 4 times
Printing position correction operation
Correct ?
No
Yes
Printing position correction error
Green ↔ Orange
Beeper : 8 times
Paper feed motor initialization
Pick-up roller initialization
Correct ?
No
Yes
Paper pick-up error
Green ↔ Orange
Beeper : Once
Paper check
Paper present
No
Paper eject operation
Execute paper eject operation for about five seconds.
Drive paper feed section for about one second
Paper check ?
Paper present
No
Paper jam
Green ↔ orange
Beeper : Twice
Next Page


Previous Page
Cartridge check
Not installed
Installed
Move cartridge to cartridge replacement position
Green ↔ orange
Beeper : Once
Install cartridge
Does not detect cartridge
Auto cleaning
When the power is turned on for the first time after the DC power cord is connected
When over 72 hours have elapsed since the last cleaning. (with a color BJ cartridge, the first cleaning is executed when the first 24 hours have elapsed1
Other than the above cases, auto cleaning is not executed
Cleaning check
Correct ?
No
Yes
Cleaning error
Green ↔Orange
Beeper : 10 times
Waste ink check
Correct ?
No
Yes
Waste ink full error
Green ↔ Orange
Beeper : 5 times
Indicator lights (green)
END

6.2.2 Error recovery

a) Error display

1. RAM Error

<Cause> RAM reading and writing is not being performed properly.
<Suspected Parts> DRAM
<Measure> Replace logic board

2. ROM Error

<Cause> During initialization, the contents in ROM cannot be read.
<Suspected Parts> Control/CG ROM
<Measure> Replace logic board.

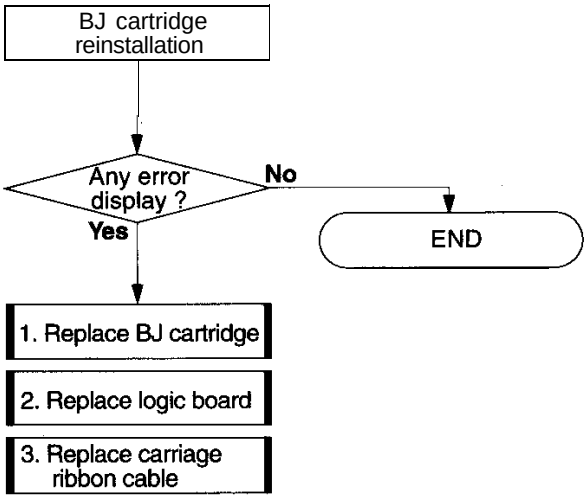
When a RAM error or ROM error occurs, the correct error display may not be displayed. When replacing the control board, check the amount of waste ink absorbed by the waste ink absorbers in the printer base unit. If necessary, also replace the waste ink absorbers.
(See "4.3 Logic ***Board and Waste Ink Absorber Replacement Cautions".)***

3. Cartridge Displaced Error

<Cause> The cartridge is not installed correctly in the cartridge replacement position.

<Suspected Parts> Cartridge, control board, carriage connector

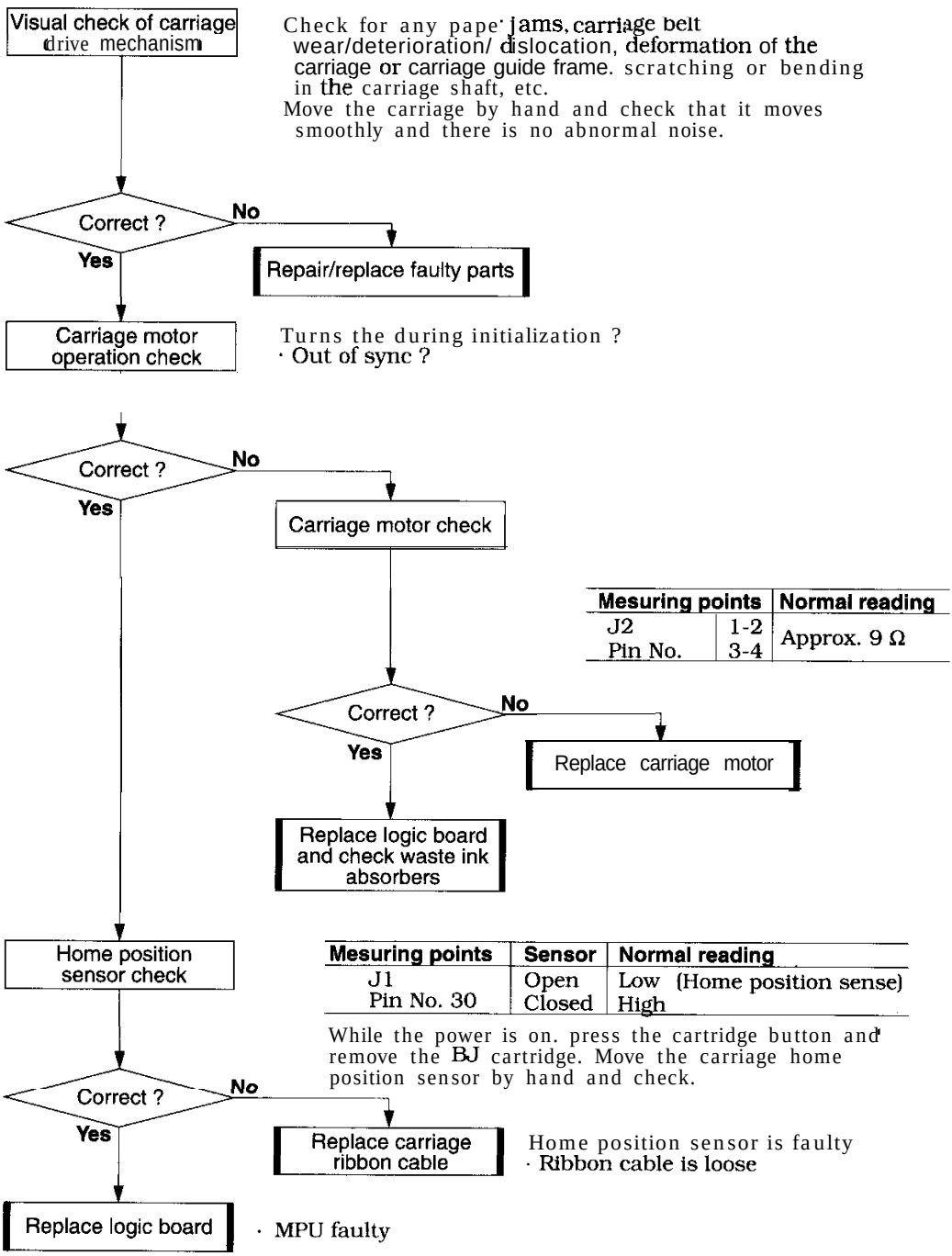
<Measure>



4.Home Position Error

<Cause> The home position cannot be detected.
<Suspected Parts> Home position sensor, carriage motor, logic board, carriage ribbon cable

<Measure>

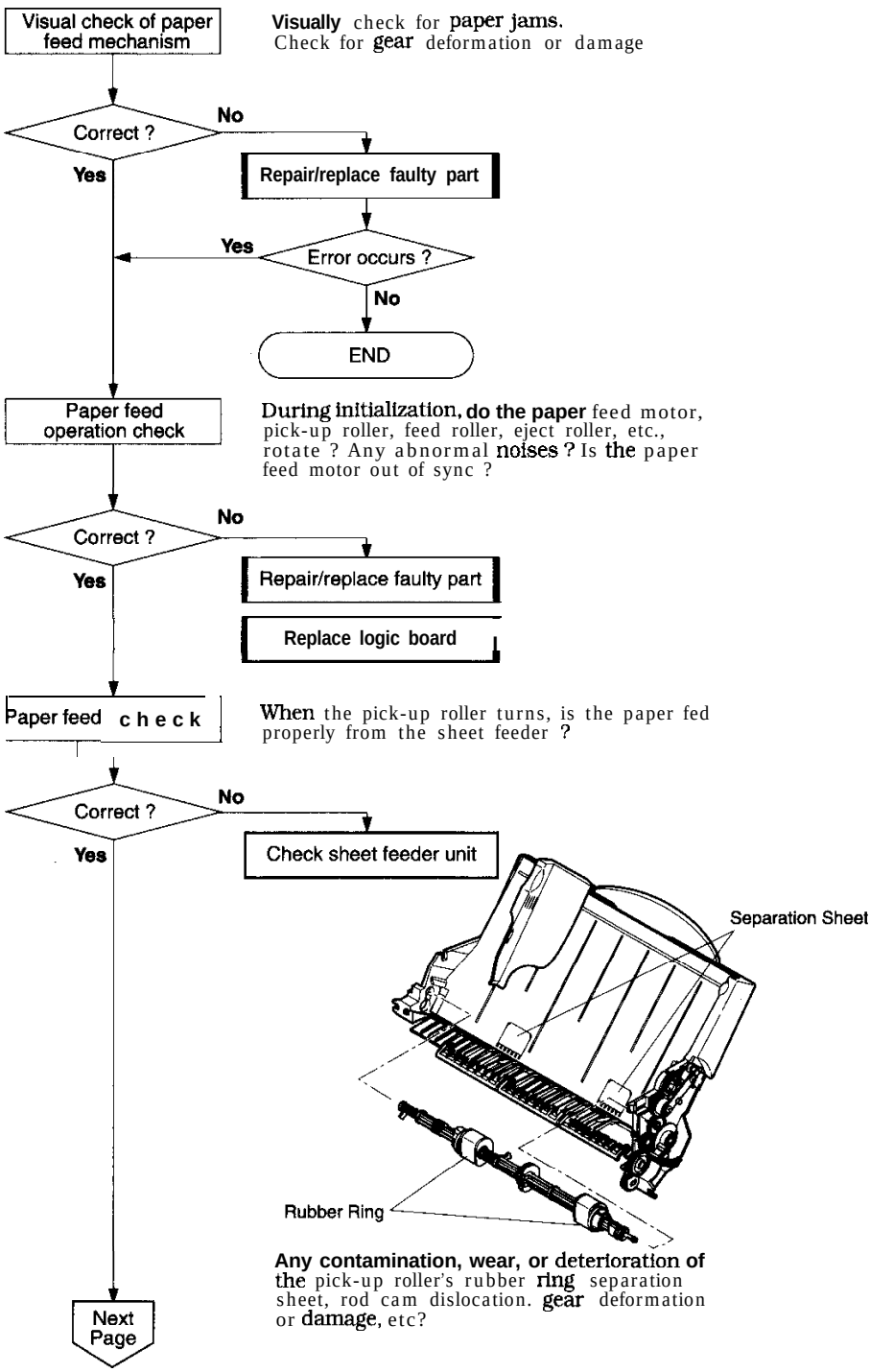

Visual check of carriage drive mechanism
Check for any paper jams, carriage belt wear/deterioration/ dislocation, deformation of the carriage or carriage guide frame. scratching or bending in the carriage shaft, etc.
Move the carriage by hand and check that it moves smoothly and there is no abnormal noise.
Correct ?
No
Yes
Repair/replace faulty parts
Carriage motor operation check
Turns the during initialization ?
· Out of sync ?
Correct ?
No
Yes
Carriage motor check
Mesuring points
Normal reading
J2 Pin No.
1-2
3-4
Approx. 9 Ω
Correct ?
No
Yes
Replace carriage motor
Replace logic board and check waste ink absorbers
Home position sensor check
Mesuring points
Sensor
Normal reading
J1 Pin No. 30
Open
Closed
Low (Home position sense)
High
While the power is on. press the cartridge button and remove the BJ cartridge. Move the carriage home position sensor by hand and check.
Correct ?
No
Yes
Replace carriage ribbon cable
Home position sensor is faulty
· Ribbon cable is loose
Replace logic board
· MPU faulty

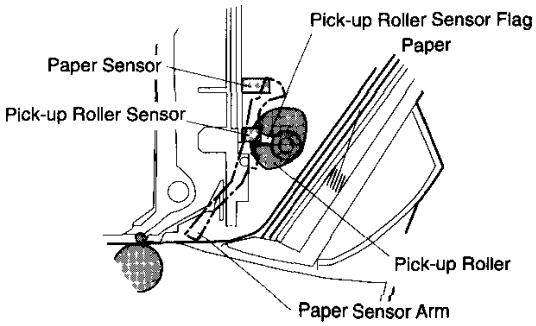
5. Paper Feed Error/Paper Jam

<Cause> •The paper feed operation is executed but the paper is not fed.
•The paper eject operation is executed but the paper is not ejected

-Suspected Parts> Paper feed mechanism, pick-up roller sensor, paper end sensor, logic board

<Measure>


Visual check of paper feed mechanism
Visually check for paper jams. Check for gear deformation or damage
Correct ?
No
Yes
Repair/replace faulty part
Yes
Error occurs ?
No
END
Paper feed operation check
During initialization, do the paper feed motor, pick-up roller, feed roller, eject roller, etc., rotate ? Any abnormal noises ? Is the paper feed motor out of sync ?
Correct ?
No
Yes
Repair/replace faulty part
Replace logic board
Paper feed check
When the pick-up roller turns, is the paper fed properly from the sheet feeder ?
Correct ?
No
Yes
Check sheet feeder unit
Separation Sheet
Rubber Ring
Any contamination, wear, or deterioration of the pick-up roller's rubber ring separation sheet, rod cam dislocation. gear deformation or damage, etc?
Next Page



Previous Page

Pick-up roller sensor flag check

Check for pick-up roller sensor flag deformation or damage.

Correct ?

No

Yes

Replace pick-up roller shaft

Pick-up roller sensor check

Mesuring points	Sensor	Normal reading
MPU Pin No. 65	open	Low level
	Closed	High level [Initial condition)

Check by moving the pick-up roller by hand while the power is on.

Correct ?

No

Yes

Replace logic board

Paper end sensor arm check

Check for any deformation or wear. Any deformation or damage ?

Correct ?

No

Yes

Replace paper end sensor arm or repair or replace the faulty part

Paper sensor check

Mesuring points	Sensor	Normal reading
MPU Pin No. 71	open	Low level (Paper present1
	Closed	High level (No paper)

Check by moving the paper end sensor arm by hand while the power is on.

Correct ?

No

Yes

Replace logic board

END

6. Waste Ink Full Error

<Cause> The waste ink absorbers' estimated waste ink amount has reached 100%
<Suspected Parts> Waste ink absorbers, logic board
<Measures> 1. Reset the EEPROM and replace the waste ink absorbers.
2. Replace logic board.

7. Temperature Sensor Error

<Cause> Thermistor is abnormal.
<Suspected Parts> Thermistor
<Measures> Replace logic board.

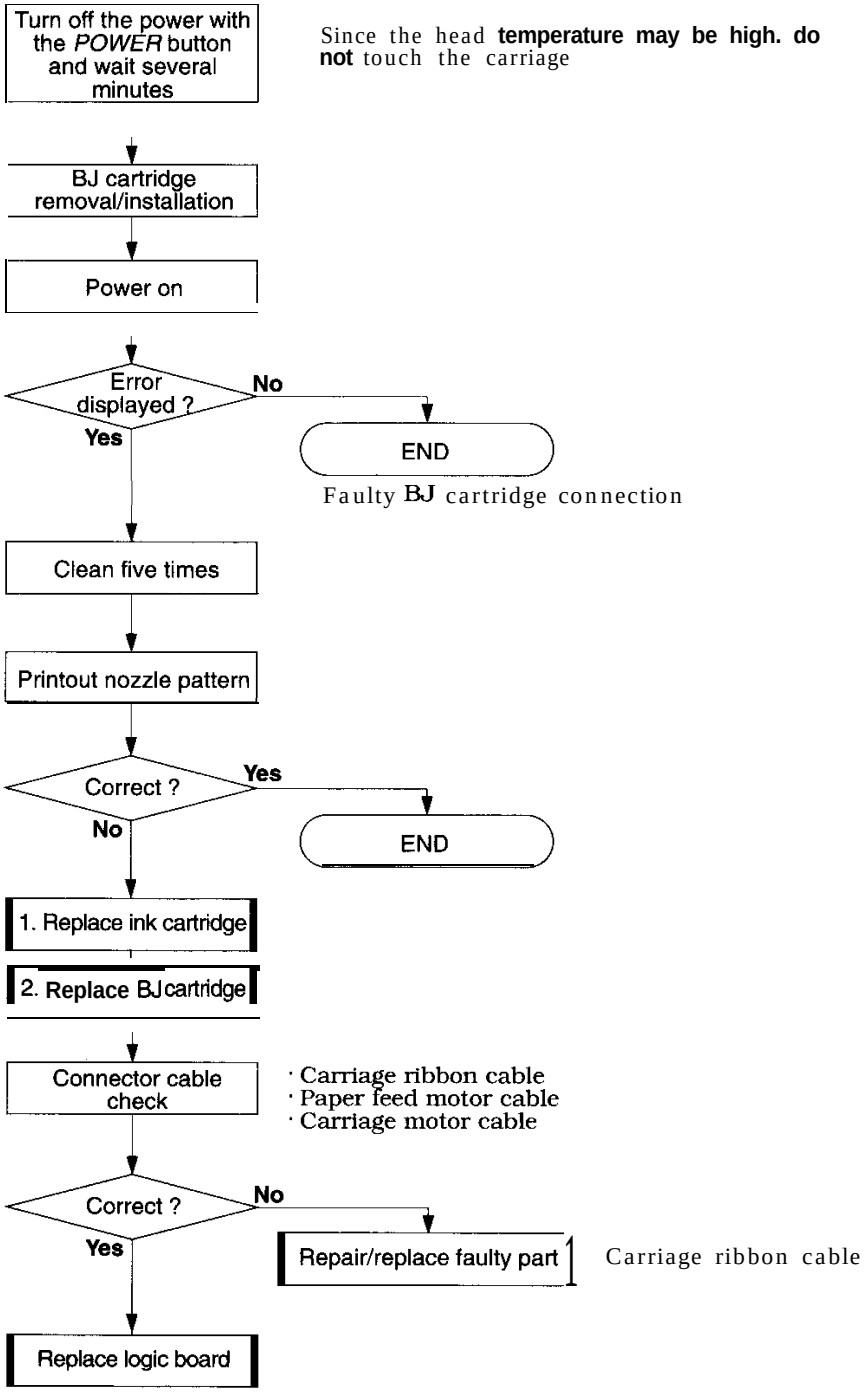
8. Printing Position Correction Error

<Cause> The printing position correction value cannot be detected.
<Suspected Parts> Carriage motor, logic board, home position sensor
<Measures> See countermeasures for home position sensor error.

9. Head Temperature Error/Head Temperature Sensor Error

<Cause> The head temperature is abnormally high
<Suspected Parts> BJ cartridge, logic board

<Measure>



10. Cleaning Error

<Cause> Cleaning is not executed properly or not being detected.
<Suspected Parts> Home position sensor, sensor arm, purge unit, carriage ribbon cable, logic board

<Measure>

Visual check of paper feed system operation

During initialization, do the paper feed motor, pick-up roller, feed roller, eject roller, etc., rotate ? Any abnormal noises ? Is the paper feed motor out of sync ?

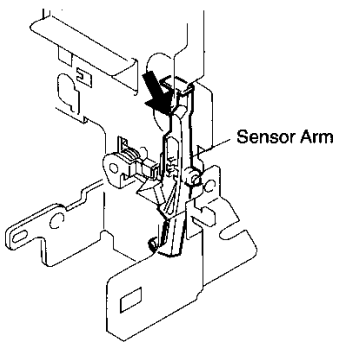
Correct ?

No

1. Repair/Replace faulty part
2. Replace logic board

Yes

Sensor arm check



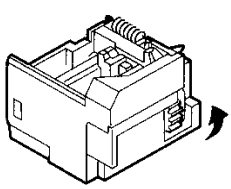
Move it by hand and see if it moves smoothly. Also, any deformation or damage at the locations indicated by the arrows ?

Correct ?

Yes

Replace sensor arm or repair/replace faulty part

Purge unit check



Remove the purge unit and move it as shown by the arrow to check if it moves smoothly. Any gear deformation or damage ?

Correct ?

No

Replace purge unit

Yes

Disassemble and check the paper feed motor drive switching mechanism

If the gear is deformed or damaged, dissemble and check the paper feed motor drive switching mechanism refer to *Part* 4: 3.42 4) Switching the paper *feed motor drive transmission (page 4-29).*

11. Scanner Cartridge Displaced Error

<Cause> Incorrect Scanner ID in spite of Scanner cartridge recognition.
Incorrect calibration data sent from the computer.

<Suspected Parts> Scanner cartridge's controller. Scanner cartridge's RAM.

<Measure> Replace scanner cartridge.

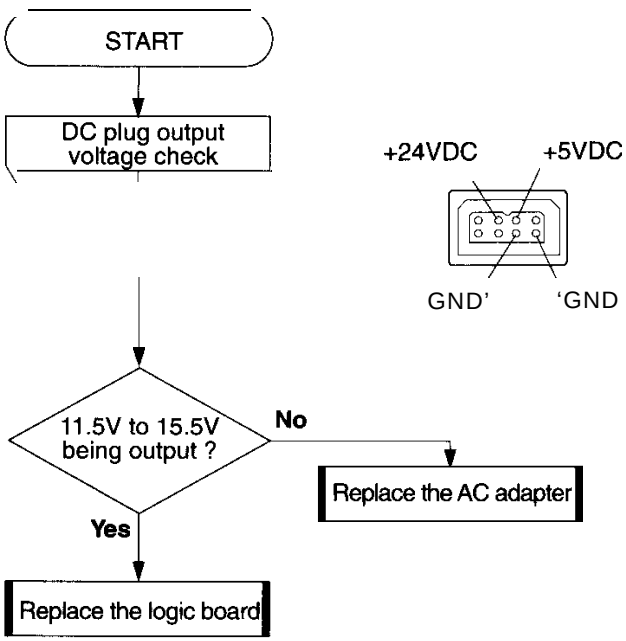
b) Symptoms

1. The Power Does Not Turn On

<Symptom> *The power does not turn on even when the POWER button is pressed.
*Even when DC power is supplied, initialization is not executed.

<Cause> The AC adapter and/or control board is faulty.

<Measure>

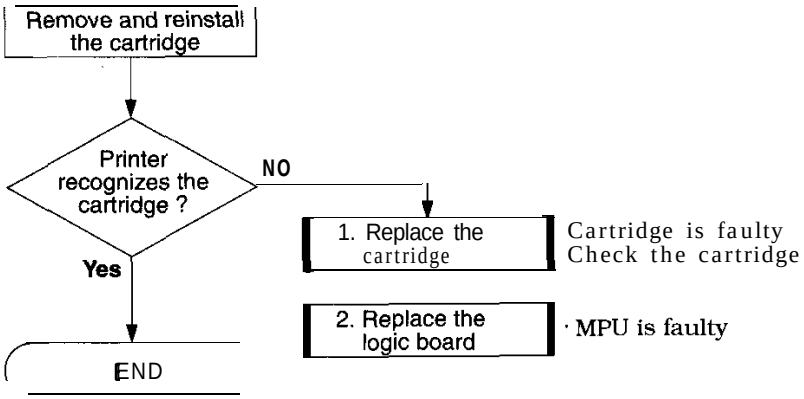


2. The Printer Does Not Recognize The Cartridge

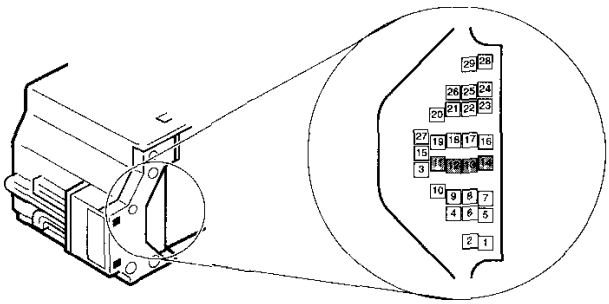
<Symptom> •The cartridge installed is not recognized.
•When a cartridge is installed, the carriage moves to the replacement position.
•The installed cartridge is recognized incorrectly.

<Cause> •Faulty contacts between the cartridge and carriage.
•The cartridge is faulty.
*The carriage ribbon cable is faulty.
•The logic board is faulty.

<Measure>



To confirm that the cartridge is not being recognized correctly, check for conductivity at the check points indicated in the diagram below.



Black BJ **Cartridge**

Check		Normal reading
Pin No.	11-14	Approx. 0 Ω
	12-14	
	13-14	

Color BJ Cartridge (Multi Drop)

Check		Normal reading
Pin No.	11-14	
	12-14	Approx. 0 Ω
	13-14	Approx. 0 Ω

Photo BJ Cartridge (Multi Drop)

Check		Normal reading
Pin No.	11-14	
	12-14	
	13-14	Approx. 0 Ω

Scanner **Cartridge (Option)**

Check		Normal reading
Pin No.	11-14	
	12-14	Approx. 0 Ω
	13-14	

Color BJ Cartridge (Reference)

Check		Normal reading
Pin No.	11-14	
	12-14	Approx. 0 Ω
	13-14	

Photo BJ Cartridge (Reference)

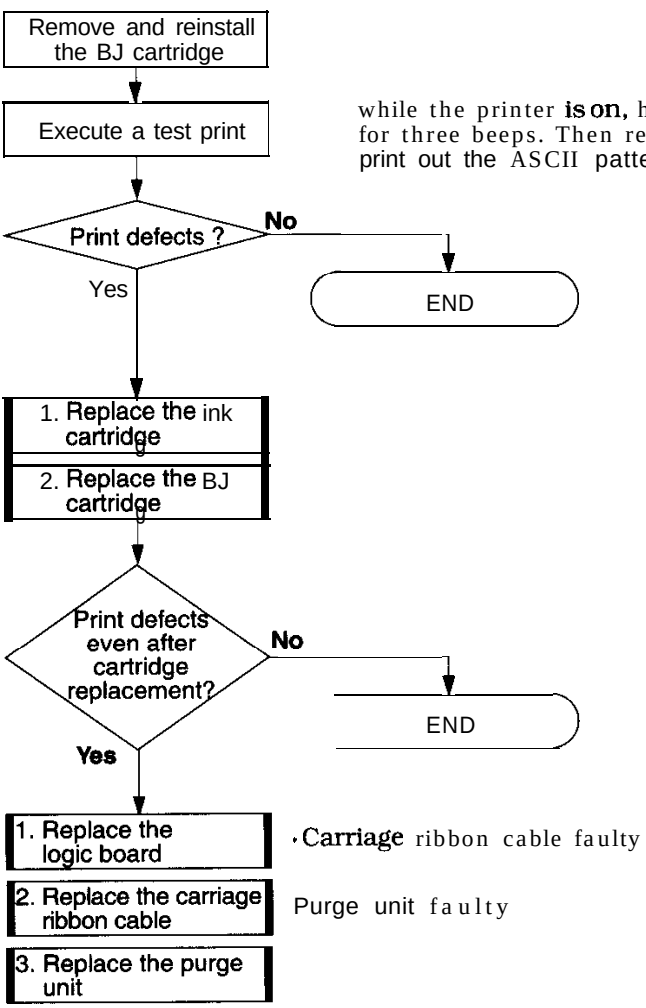
Check		Normal reading
Pin No.	11-14	
	12-14	∞
	13-14	

3. Faulty Printing <1>: No Printing

<Symptom> •The printer does not print at all.
*Printing stops mid-way.
*Only a certain color is printed.

<Cause> •The ink has run out or the BJ cartridge is faulty.
•The control board, the carriage ribbon cable, or the purge unit is faulty.

<Measure>


Remove and reinstall the BJ cartridge
Execute a test print
while the printer is on, hold down the POWER button for three beeps. Then release the POWER button to print out the ASCII pattern.
Print defects ?
No
Yes
END
1. Replace the ink cartridge
2. Replace the BJ cartridge
Print defects even after cartridge replacement?
No
END
Yes
1. Replace the logic board
2. Replace the carriage ribbon cable
3. Replace the purge unit
•Carriage ribbon cable faulty
Purge unit faulty

4 Faulty Printing <2>: White Stripes Appear

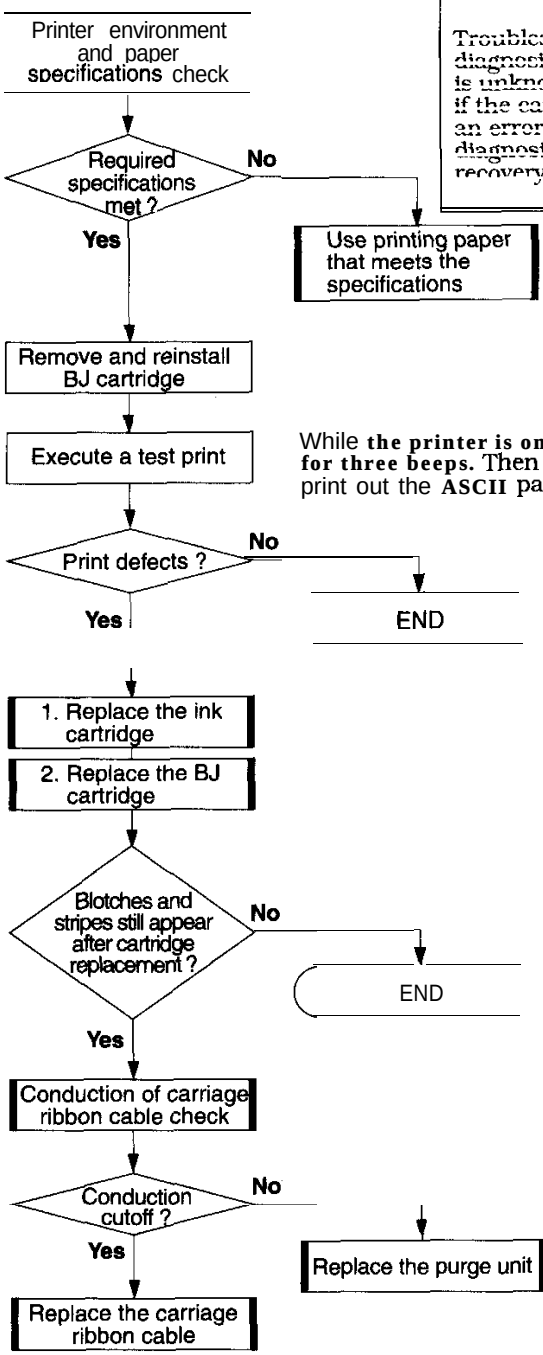
<Symptom> *There is blotching.
-There are white stripes.
*The specified dots are not printed.

<Cause> •The BJ cartridge or cartridge contacts are faulty.
*The carriage ribbon cable is faulty.
•The purge unit or paper feed mechanism (missing gear tooth) is faulty.

<Measure>

White Line Sample

Troubleshooting consists of error condition diagnosis, which is required if the cause of an error is unknown, and error recovery, which is performed if the cause of an error is known. If the cause of an error is unknown, perform the error condition diagnosis, and if it is known, perform error recovery


Printer environment and paper specifications check
Required specifications met ?
No
Yes
Use printing paper that meets the specifications
Remove and reinstall BJ cartridge
Execute a test print
While the printer is on, hold down the POWER button for three beeps. Then release the POWER button to print out the ASCII pattern.
Print defects ?
No
Yes
END
1. Replace the ink cartridge
2. Replace the BJ cartridge
Blotches and stripes still appear after cartridge replacement ?
No
END
Yes
Conduction of carriage ribbon cable check
Conduction cutoff ?
No
Yes
Replace the purge unit
Replace the carriage ribbon cable

5 Faulty Printing <3>: Other Print Problems

Symptom	Check Item	Measures
Paper contamination	Ink mist on the platen.	Use a soft cloth moistened with water to clean.
	Ink has clogged around the head's nozzles. (No paper contamination during paper feeding and discharging.)	Clean a few times. If problem persists, replace the BJ cartridge.
	Ink has clogged (or paper bits have stuck) around the purge unit's head wiper or head capping area.	Replace purge unit.
	Ink has adhered to the paper transport system. (The paper is already contaminated by the time it reaches the platen.)	Disassemble the paper transport system and use a soft moist cloth to clean.
Spur tracks appear	Ink has adhered to the spurs.	Use a soft toothbrush to clean.
	The spurs have deformed.	Replace the spurs.
Vertically-oriented printed lines are misaligned.	The BJ cartridge is installed incorrectly.	Reinstall the BJ cartridge correctly.
	The paper thickness lever is not set properly.	Set the lever at the specified position.
	The problem occurs when the user's BJ cartridge (causing the problem) is installed in a normally-operating printer.	Replace the BJ cartridge.
	The head gap has not been set correctly.*	Adjust the head gap. [See 5. *Adjustments on* page **5-S.)**
Corrugated printing	The carriage guide frame is deformed.	Replace the carriage guide frame.
	Frictional wear between the carriage base and carriage shaft.	Replace the carriage unit.
The printout is either light or dark.	Check the printing mode.	Set the desired printing mode.
	The BJ cartridge is faulty.	Replace the BJ cartridge.

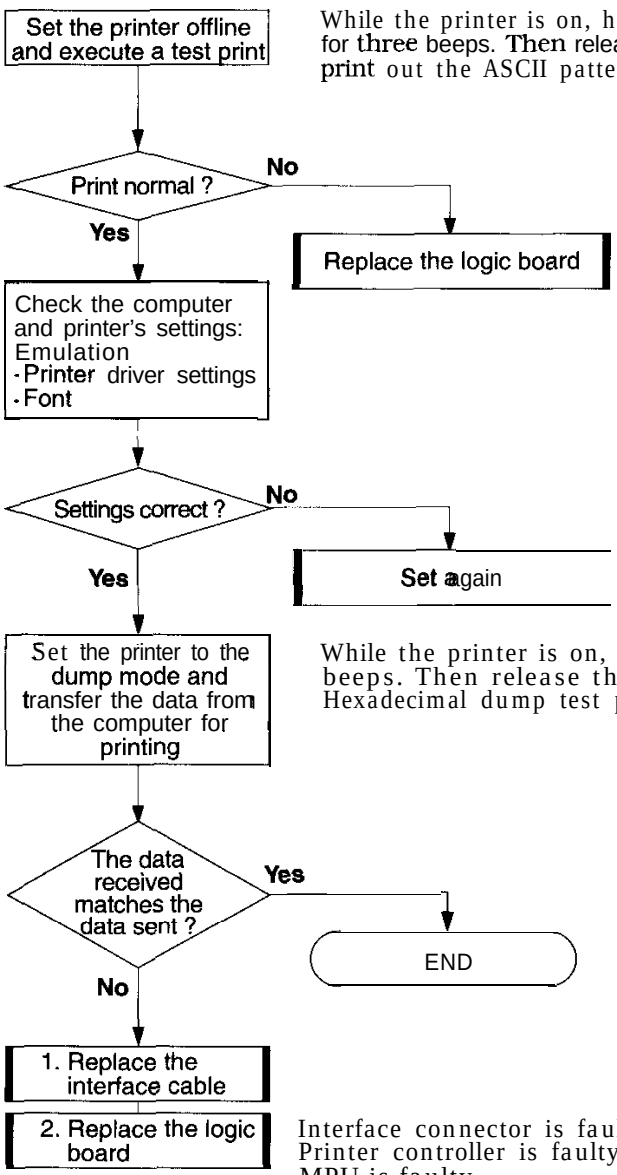
* Checking this is difficult. Readjust the head gap and then check whether it fixes the problem.

6. Faulty Interface

<Symptom> -Nothing is printed.
•An unspecified font is printed.
*An unspecified color is printed.

<Cause> •The printer driver setting is faulty.
•The interface cable is faulty.
•The printer's logic board is faulty.

<Measure>


Set the printer offline and execute a test print
While the printer is on, hold down the POWER button for three beeps. Then release the POWER button to print out the ASCII pattern.
Print normal ?
No
Yes
Replace the logic board
Check the computer and printer's settings:
Emulation
- Printer driver settings
- Font
Settings correct ?
No
Yes
Set again
Set the printer to the dump mode and transfer the data from the computer for printing
While the printer is on, hold down the POWER button for five beeps. Then release the POWER button to print out the Hexadecimal dump test printout.
The data received matches the data sent ?
Yes
END
No
1. Replace the interface cable
2. Replace the logic board
Interface connector is faulty
Printer controller is faulty
MPU is faulty

7. LOCATION & SIGNAL ASSIGNMENT

7.1 Logic Board

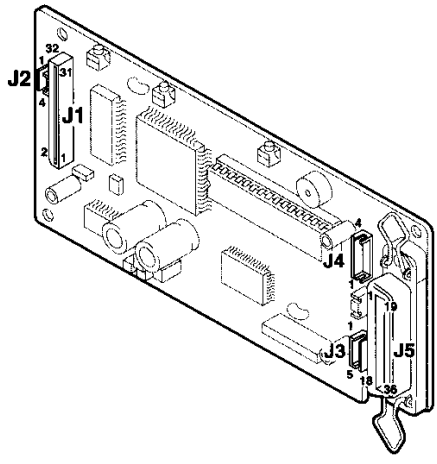


Figure 5-9 Logic Board

J1 (Ribbon cable connector)

Pin No.	Signal name	IN/OUT	Description
1	HVG		GND for head drive voltage VH
2	HVG		GND for head drive voltage VH
3	HTO	IN	Driver signal for temperature control heater
4	HT1	IN	Driver signal for temperature control heater
5	HVH	OUT	Head driver voltage
6	HVH	OUT	Head driver voltage
7	W-HT	OUT	Drive signal for temperature control heater
6	INKS1		Not used
9	TOP	IN	Detection signal for rank resistance
10	DIODEA	OUT	Head temperature sensor (diode) anode
11	ID0	IN	Cartridge detection and recognition signal
12	ID1	IN	Cartridge detection and recognition signal
13	INKS2	IN/OUT	Cartridge detection and recognition signal
14	HVss		Head's logic drive voltage HVdd GND
15	HENBO(Y)	OUT	Heat enable
16	Even ENB	OUT	Even nozzle heat enable
17	HENB1 (M)	OUT	Heat enable
16	HENB3(B)	OUT	Heat enable
19	Odd ENB	OUT	Odd nozzle heat enable
20	BENB1	OUT	Block enable generation signal
21	BENB2	OUT	Decoder output signal
22	BENB3	OUT	
23	HVdd	OUT	IC drive voltage (+5 V)
24	HCLK	OUT	Print data transfer signal
25	HLATCH	OUT	Timing signal for print data to latch
26	HRES	OUT	Latch reset signal
27	HENB2(C)	OUT	
26	HDATA	OUT	Printing data
29	DIODEK	IN	Head temperature sensor (diode) cathode
30	HPO	IN	Home position sense High/Low(sense)
31	HPG		Ground
32	HPA	OUT	Photo LED drive

J2 (Carriage motor connector)

Pin No.	Signal name	IN/OUT	Description
1	CRA	OUT	Carriage motor phase A
2	CRA	OUT	Carriage motor phase A
3	CRB	OUT	Carriage motor phase B
4	CRB	OUT	Carriage motor phase B

J3 (Paper feed motor connector)

Pin No.	Signal name	IN/OUT	Description
1	LFB	OUT	Paper feed motor phase B
2	LFA	OUT	Paper feed motor phase A
3	VM	...	Common
4	LFA	OUT	Paper feed motor phase A
5	LFB	OUT	Paper feed motor phase B

J4 (DC power connector)

Pin No.	Signal name	IN/OUT	Description
1	vcc	IN	5 VDC
2	GND	...	Ground
3	GND	...	Ground
4	VH	IN	24 VDC

J1 (Interface connector)

Pin No.	Signal name	IN/OUT	Description
1	STROBE	IN	See Part2 for details
2	DATA1	IN	
3	DATA2	IN	
4	DATA3	IN	
5	DATA4	IN	
6	DATA5	IN	
7	DATA6	IN	
8	DATA7	IN	
9	DATA6	IN	
10	ACKNLG	OUT	
11	BUSY	OUT	
12	P.E.	OUT	
13	SELECT	OUT	
14	AUTO FEED XT	IN	
15	N.C		
16	INIT	IN	
17	GND		
18	N.C		
19	STROBE-RET		
20	DATA1 -RET		
21	DATA2-RET		
22	DATA3-RET		
23	DATA4-RET		
24	DATA5-RET		
25	DATA6-RET		
26	DATA7-RET		
27	DATA8-RET		
28	ACKNLG-RET		
29	BUSY-RET		
30	P.E.-RET		
31	INIT	IN	
32	ERROR	OUT	
33	GND		
34	N.C		
35	+5.0V		
36	SELECT IN	IN	

[redacted]

8.1 Parts Layout

8.1 .1 Logic board

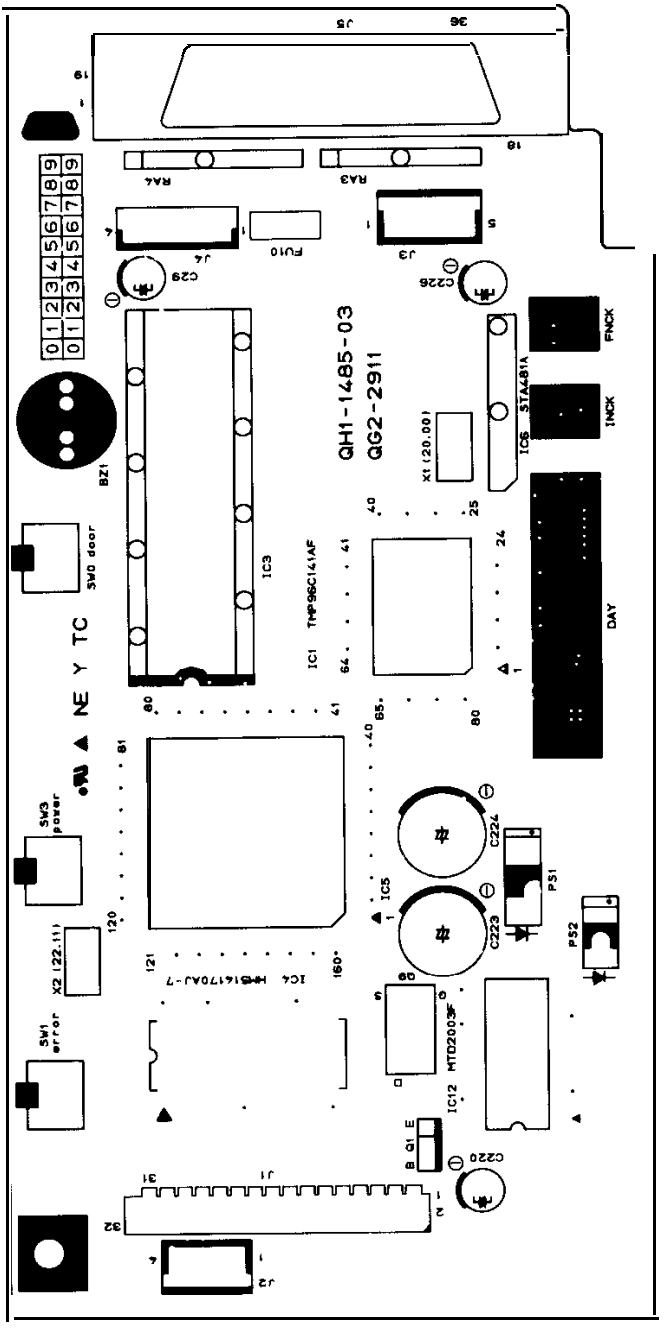


Figure 5-10 Logic Board (Top View)

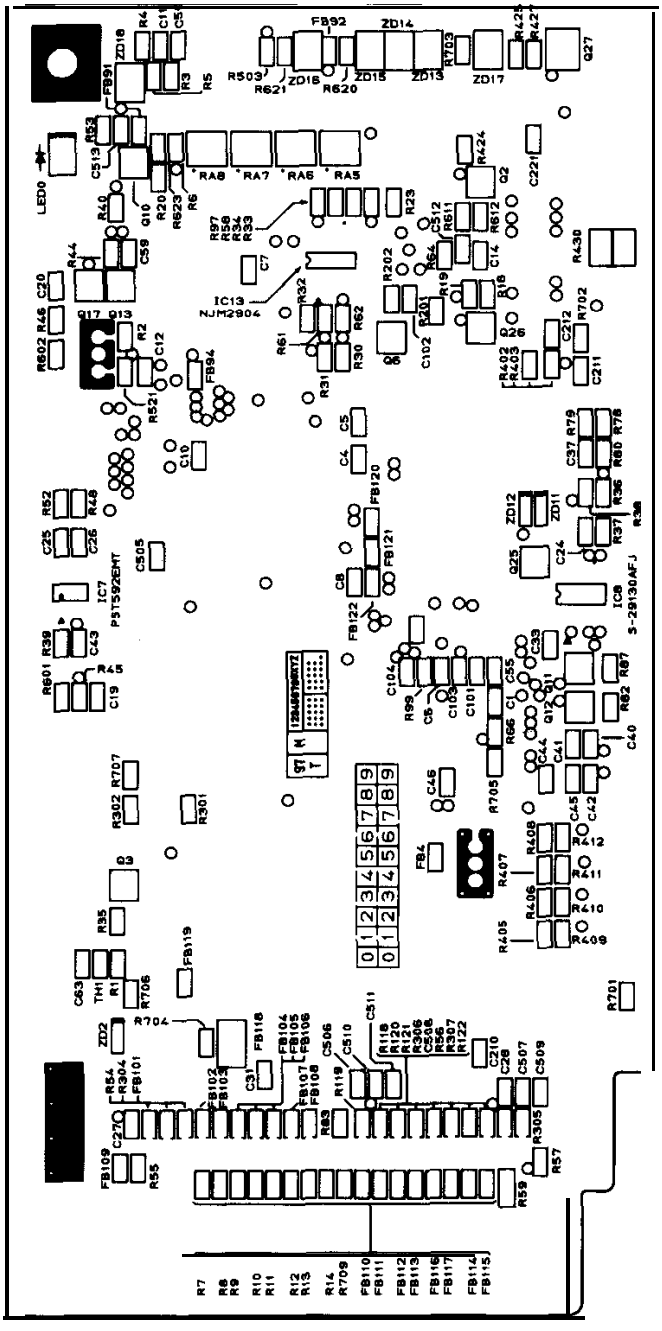


Figure 5-11 Logic Board (Bottom View)